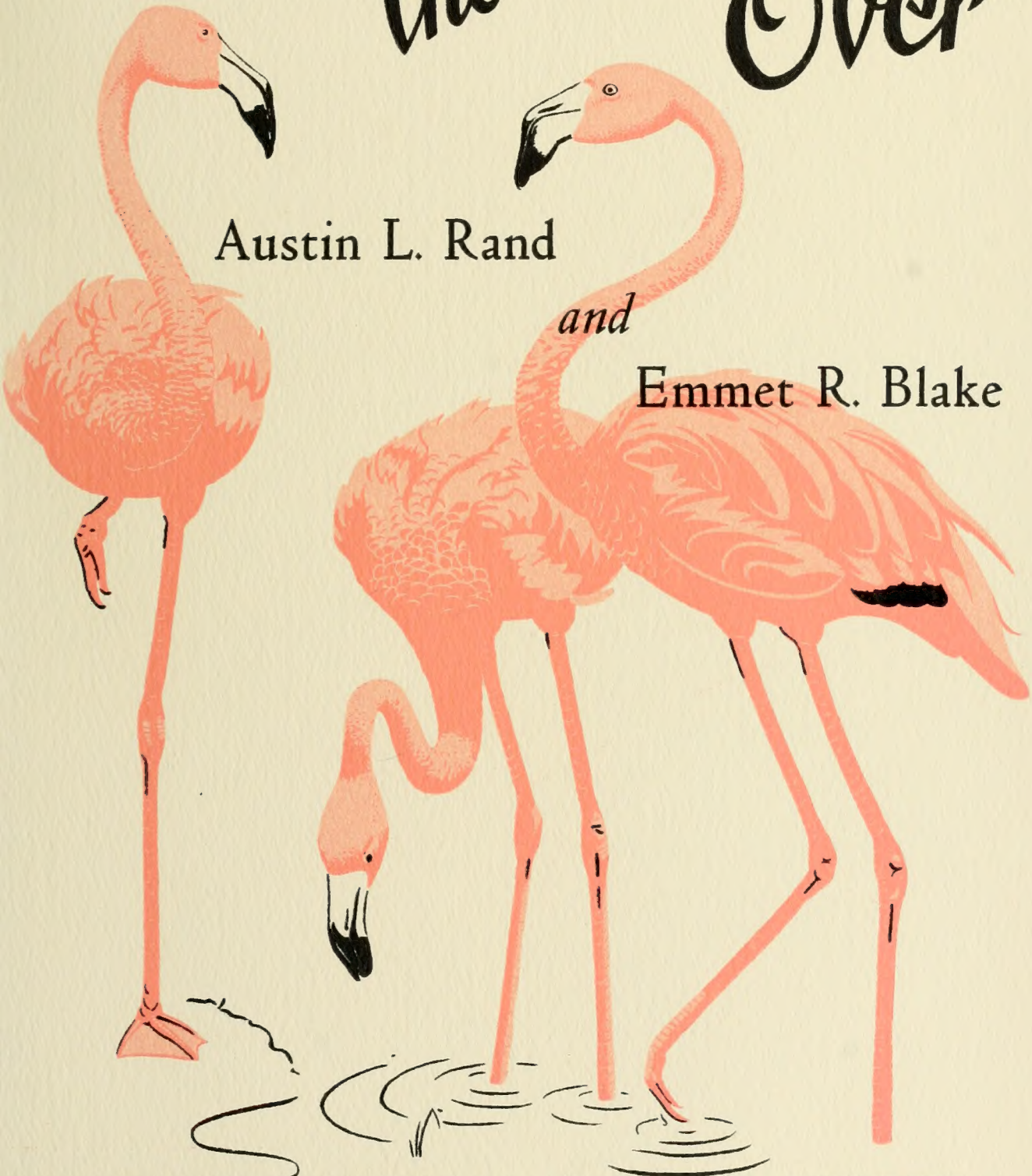


Birds the World Over

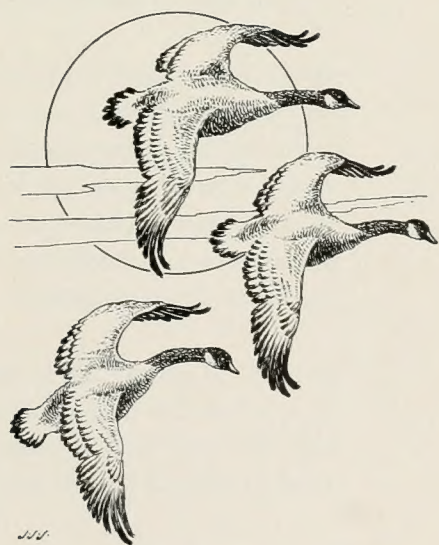
Austin L. Rand

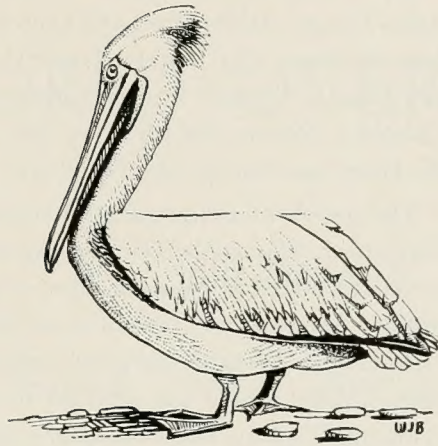
and

Emmet R. Blake



CHICAGO NATURAL HISTORY MUSEUM





Preface

If the Museum visitor has a half hour to devote to the Hall of Habitat Groups of Birds (Hall 20) he can spend less than a minute on each group. This is not long to view the scenery as shown from vantage points in five continents, several islands, and Antarctica. Few people would travel to these places without elaborate preparations, guides, and maps, and cameras and notebooks to record their impressions in permanent form. In this hall presenting habitat groups of birds, the landscapes and the birds have been brought together from points as far apart as the Bering Sea and Antarctica; and the Chicago area, Scotland, Indo-China, the Kalahari Desert, New Zealand, and Laysan Island are represented. In this booklet the thoughtful visitor has a ready-made guide to what is to be seen, and after he has finished the trip, an illustrated record of what there was to see.

These habitat groups represent two stages in the development of this type of exhibit. The groups in the east end of the hall present an early kind of display in which the exhibit can be viewed from two sides, and in which the background is painted on two flat walls. The groups in the west end of the hall present the modern type of habitat exhibit, with curved panoramic background. Looking into such an exhibit is like looking out of a window onto the natural scene. The natural objects in the foreground blend with those painted on the curved wall so that it is difficult to tell where one leaves off and the other begins.

The earlier exhibits were prepared under the direction of Mr. Charles B. Cory, the first Curator of Ornithology in the Museum, most of the recent exhibits were installed under the direction of Mr. Rudyerd Boulton, Curator of Birds until 1945, and the latest under the direction of Dr. Austin L. Rand, the present Curator of Birds.

The taxidermy and accessories of the earlier bird groups were the work of Messrs. Julius Friesser, Ashley Hine, and Leon L. Pray; of the more recent groups, of Messrs. John La Bonte, Carl Cotton, Frank H. Lett, John W. Moyer, Arthur G. Rueckert, and Leon L. Walters. The backgrounds of the earlier groups were painted by Mr. Charles A. Corwin and Mr. Pray. Mr. Rueckert painted the more recent ones, and the latest was done by Mr. Douglas E. Tibbitts.

The specimens and accessory materials for the 32 habitat groups now in Hall 20 were either collected by Museum expeditions or obtained through the generosity of various friends of the Museum. Most of the North American exhibits and several from tropical America were presented by Mr. Stanley Field, while others were a gift of Colonel A. A. Sprague; the actual collecting was done by members of the Staff. The green peafowl exhibit was provided by the late Dr. Wilfred Osgood, formerly Chief Curator of Zoology, who conducted a personally financed expedition to French Indo-China for that purpose.

Many of the exotic exhibits resulted from expeditions sponsored by patrons of the Museum. One expedition, conducted by Mr. Leon Mandel, collected the three habitat groups of Guatemala. Mr. Sewell Avery sponsored an expedition to Brazil to procure material for the exhibit of rheas. Two of the four African groups were obtained by Mrs. Oscar Strauss of New York City, during the course of her expedition to West Africa. The third African exhibit, that of the Kalahari Desert, was collected and presented by Mr. Arthur S. Vernay, also of New York, and the fourth, by Mr. and Mrs. Walther Buchen, of Winnetka, Illinois.

Several of the groups were presented by scientific or civic societies. The emperor penguins were a gift of the Chicago Zoological Society. These interesting birds, captured alive by the Byrd Antarctic Expedition of 1935, were exhibited by the Society at Brookfield Zoo some time before their death. Of special note, also, is the white stork exhibit, a gift of the Polish American Chamber of Commerce of Warsaw, Poland.

BIRDS the WORLD OVER

as shown in

Habitat Groups in Chicago Natural History Museum



AUSTIN L. RAND

Curator, Division of Birds

and

EMMET R. BLAKE

Associate Curator, Division of Birds

CHICAGO NATURAL HISTORY MUSEUM

1954

PRINTED IN THE UNITED STATES OF AMERICA
BY CHICAGO NATURAL HISTORY MUSEUM PRESS

Contents

Holarctic Region

North American Birds

	PAGE
Local Marsh Birds near Chicago	20
Illinois Winter Birds	22
Winter Birds of Lake Michigan	24
American Cranes in Indiana	26
American Herons in Michigan	28
Common Loon in Michigan	30
Ruffed Grouse	32
Wild Turkey	34
Golden Eagle in North Dakota Bad Lands	36
Canadian Water Birds of a Prairie Lake	38
White Pelican in a Saskatchewan Lake	40
California Condor	42
Bering Sea Birds on the Pribilof Islands	44

Birds of the Hawaiian Islands

Laysan Island Nesting Sea-Birds	48
---	----

Birds of Europe and Asia

Red Grouse in Scotland	51
White Stork Nesting in a Polish Village	53
Ruff Courtship Dance on a Dutch Meadow	55
Eagle Owl	57

Ethiopian Region

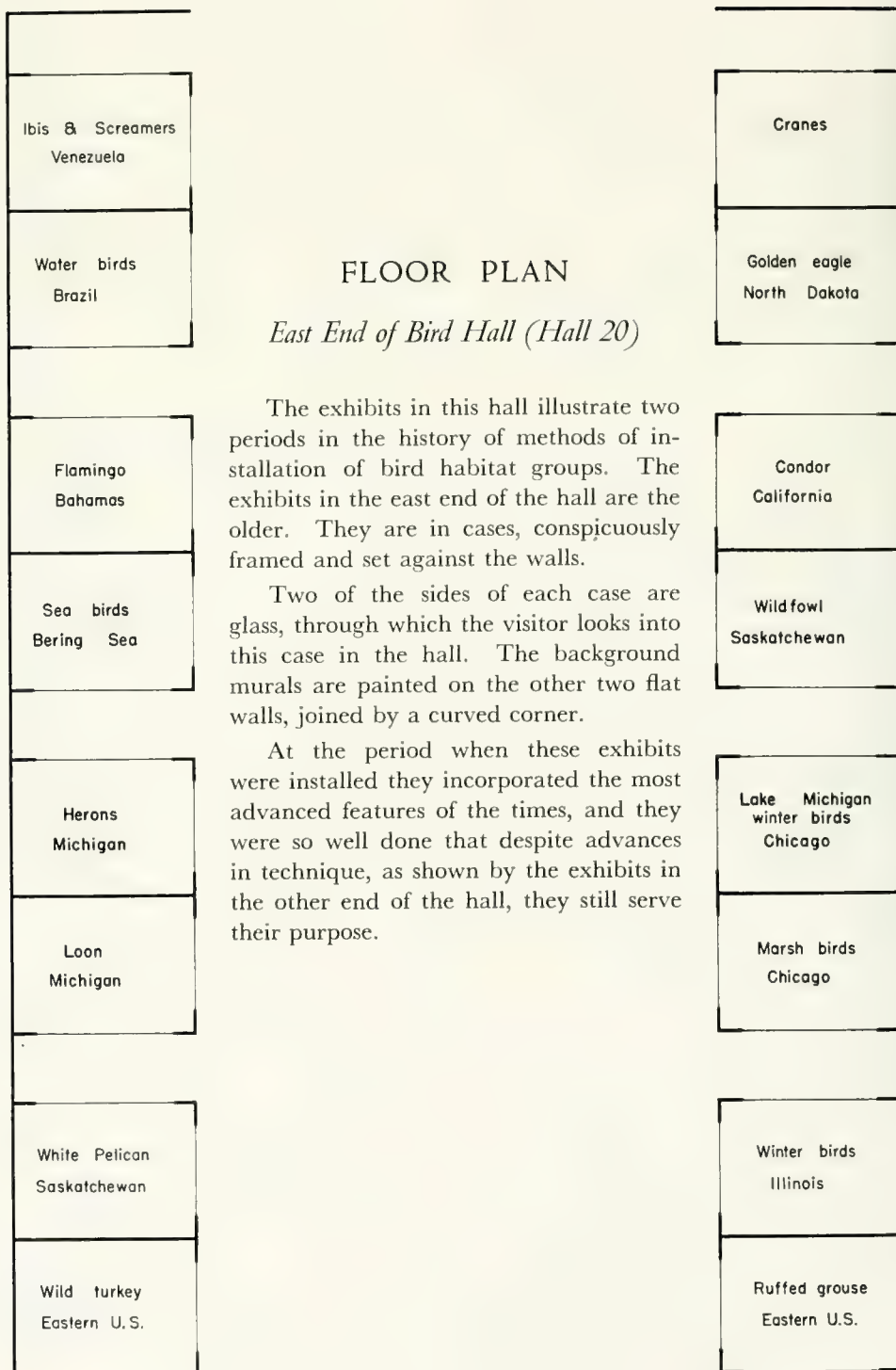
Mount Cameroon; Birds of an African Mountain Forest	60
Kalahari Desert; Birds of the Dry Country	63
Village Weaver Bird in the Savanna Country	64
Birds of a Nile Papyrus Marsh	66

Oriental Region	PAGE
Green Peafowl	70
Australian Region	
North Island Kiwi Nest in New Zealand	74
Neotropical Region	
Guatemala Forest; Birds of the Tropical Central American Lowlands .	78
Common Rhea on the Brazilian Campo	80
A Colonial Nest-Builder, the Montezuma Oropendula	82
Quetzal in a Cloud Forest	84
Ibis and Screamers in Northern Venezuela	86
Brazilian Water Birds	89
Flamingos Nesting in the Bahamas	90
<i>Antarctic Birds</i>	
Emperor Penguins	94



THE
WHALE-HEADED
STORK

A detail of the exhibit
shown on page 66



FLOOR PLAN

East End of Bird Hall (Hall 20)

The exhibits in this hall illustrate two periods in the history of methods of installation of bird habitat groups. The exhibits in the east end of the hall are the older. They are in cases, conspicuously framed and set against the walls.

Two of the sides of each case are glass, through which the visitor looks into this case in the hall. The background murals are painted on the other two flat walls, joined by a curved corner.

At the period when these exhibits were installed they incorporated the most advanced features of the times, and they were so well done that despite advances in technique, as shown by the exhibits in the other end of the hall, they still serve their purpose.



FLOOR PLAN

West End of Bird Hall (Hall 20)

This, the more modern end of the hall, is nearly completed. Two small spaces are still empty. One is tentatively allocated to mound-builders and their nests; the other to a whistling swan—tundra scene.

The big advance in these exhibits over those in the east end of the hall is that you look out of the hall through a window, onto the scene. The impression of space, distance, and actuality is thus greatly heightened.

The construction of the background is also different: no longer are there two murals on two flat walls for each scene. A single curved wall holds the mural, heightening the illusion that the real foreground and the painted background are one, and sweeping to the horizon.





BIRDS THE WORLD OVER

Introduction

The exhibits in the Hall of Habitat Groups of Birds (Hall 20) represent birds in their natural surroundings. In some groups attention is focused on a single species, as in the group showing the golden eagle and its nest; in others the scene presents the birds that frequent a particular kind of country, as in the group showing the birds of a marsh in the neighborhood of Chicago. What the observer sees, as he looks into an exhibit, is what he would see if he were in the field at the locality represented, and were fortunate enough to be there at exactly the right time.

Walking through the hall is like embarking on a journey by magic carpet, travelling from continent to continent and visiting desert, mountain, and forest. The birds one sees are the realistic products of the taxidermist's treatment of skins and feathers; the habitat includes the accessories—the leaves, branches, grass, and earth in the foreground, which may be in part artificial, and the painted background. Studies have usually been made and material collected on the spot, and the whole is as true to life as the scientist and the artist can make it.

Kinds of birds differ from place to place, but birds are not spread haphazardly over the globe. The ranges of the different species, and the genera into which they are grouped, and the families into which the genera are grouped, present definite patterns when drawn on a map. These patterns are mainly in accord with present-day geography, but are influenced by past geological changes and differences of climate and vegetation.

Birds probably originated in the warmer parts of the globe, some time before the end of the Jurassic Period, 155,000,000 years ago. As they evolved and differentiated, they spread over most of the world and became adapted to local conditions. This was and is a continuing process, part of the whole process of evolution. Land birds, for instance, reached some areas by land connections, over such bridges as that which crossed

the Bering Sea at times in the past. Others probably arrived over seas, like the waifs and strays that became established as the fauna of the Hawaiian Islands. Each major land mass—North America, South America, Eurasia, Africa, and Australia—had a greater or less amount of isolation, decreasing at times with establishment of broader and closer land connections, increasing at times with their disappearance. In this partial isolation, each land mass gradually evolved its own assemblage of birds—its bird fauna—from the various immigrants that came progressively and are still coming to it. There was shifting back and forth, with re-invasion and re-immigration, but the isolation has been long enough and strict enough to produce a characteristic bird life in each major land area. Certain groups of water birds became adapted to certain conditions—penguins to Antarctic waters, frigate birds to tropical seas, and auks to northern waters. Certain types of birds became so dominant and adaptable that they were able to spread to most parts of the world or to all the oceans.

In spite of this immigration and emigration, these exoduses and invasions, the faunas of various parts of the world are so distinct that if a traveller tells you what birds he has seen, you can tell what part of the world he has been in. If he speaks of nesting emperor geese, he must have been in the Bering Sea area; if of nesting emperor penguins, on the Antarctic ice shelf; if of rifle birds, in New Guinea or North Australia; if of kiwis, in New Zealand.

It is useful to give names to the areas that are occupied by various faunas of birds, or to regions that are the centers of distribution of members of related species. The continents may not be completely occupied by the faunas essentially characteristic for them. North Africa, for example, does not have an African fauna, but a Eurasian one; the Sahara, and not the Mediterranean, is the barrier. The break between two faunas is not always explainable from present topography. From Malaya through Sumatra, Java, and Bali, the fauna remains south Asiatic in character; but across the narrow straits, on the island of Lombok, the bird fauna is suddenly Australian. This is only understandable on the basis of former land changes now amply documented by geologists. There have been various sets of divisions of the surface by zoogeographers, many with points of disagreement, but the divisions presented below, based on the study of animal distribution, seem to represent the most useful set of concepts. The regions, characterized by families or groups of genera restricted to them, must be interpreted in the light of the fact that there are also groups of birds that are more widespread.

Holarctic Region: This includes Europe and all of Asia except the tropical southern part. It also includes Africa north of the Sahara, the Arctic islands, and North America south to the line of tropical rain-forest in Mexico.

Ethiopian Region: This is Africa south of the Sahara, and is very well characterized. As here understood, it also includes Madagascar, though Madagascar could well be considered as a separate region. Southern tropical Asia is excluded and placed in another region, the Oriental, though a strong case could be made for including it in the Ethiopian Region.

Oriental Region: This includes India, the Malay countries, and the East Indian Islands as far as Wallace's Line, which lies between Bali and Lombok. It is not well characterized, compared with the African fauna, and could easily be included as a modified extension of the Ethiopian Region.

Australian Region: This includes a number of centers of distribution that some workers incline to consider as separate regions; namely, Polynesia, New Zealand, Australia, and Papua. Here they are considered sub-regions.

Neotropical Region: This includes South and Central America, and forms a very distinct region. The West Indies, though showing a pronounced North American influence, are included.

In addition, many groups of birds are more widespread, so that their distributions do not fit the above pattern; these include:

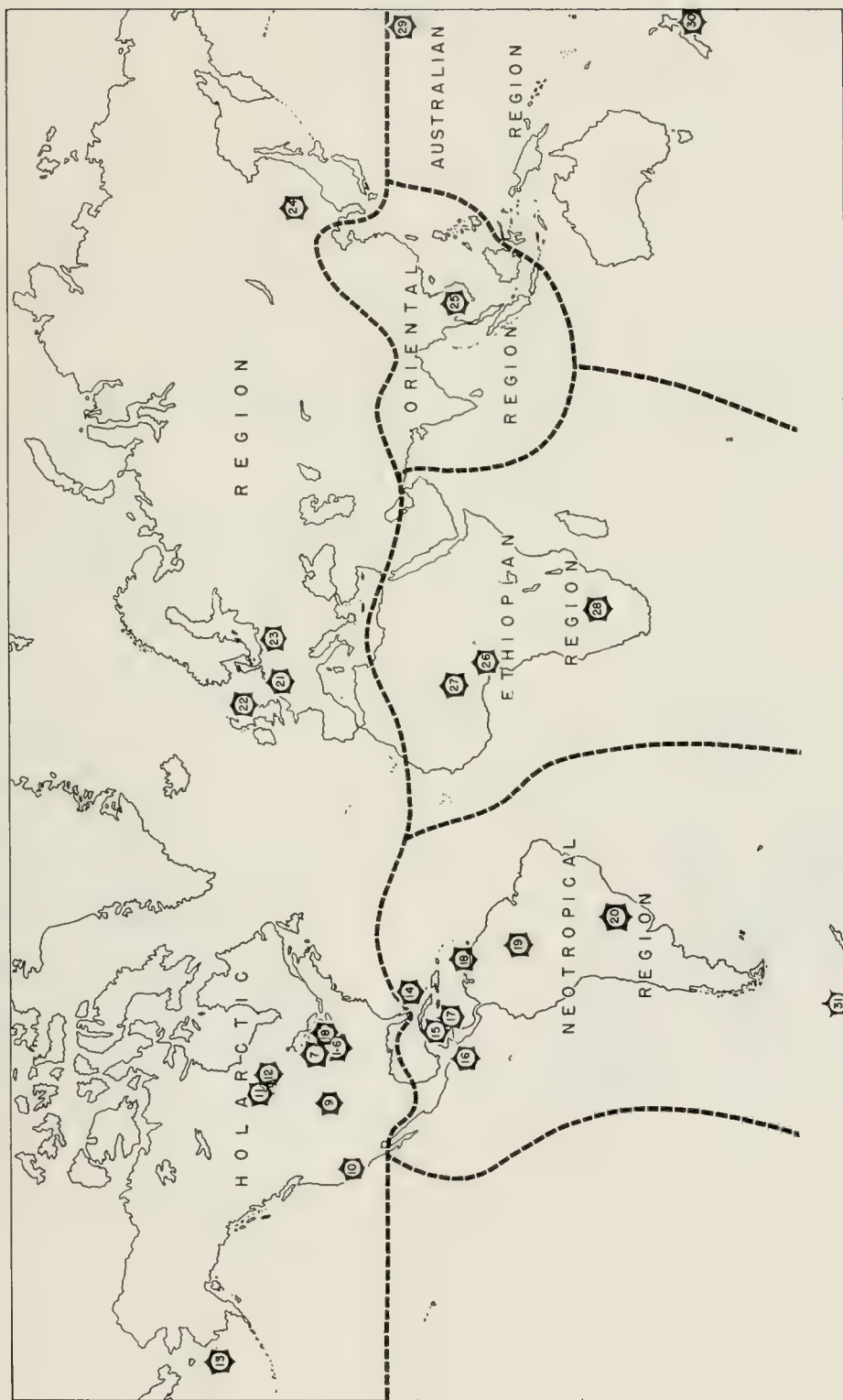
- (1) Pan-tropical groups of sea birds, such as frigate birds, tropic birds, and boobies (largely) in most tropical waters; land birds such as parrots, barbets and trogons, found in the tropics of both the Old and New Worlds (but the last two absent in the Australian area).
- (2) Pan-boreal groups in the northern part of the Old and the New Worlds, many species with a circumpolar distribution. This is particularly true of the Arctic, where there are no obvious differences between the New World groups and those of the Old World.
- (3) Pan-Austral groups in the southern part of the southern ocean, including the penguins and many petrels and albatrosses, which have a widespread distribution in southern oceans around the South Pole, ranging northward to varying distances.

The above cases of wide range include birds that occupy belts of habitat around the earth, parallel with the equator. There are also a

MAP SHOWING FAUNAL AREAS OF THE WORLD

Numbers indicate the localities from which exhibits come

1-8	Chicago area and near-by: Local marsh birds; Illinois winter birds; winter birds of Lake Michigan; American cranes; American herons; common loon; ruffed grouse; and wild turkey	20	Brazil: Rheas
9	North Dakota: Golden eagle	21	Holland: Ruff
10	California: California condor	22	Scotland: Red grouse
11, 12	Saskatchewan: Water birds and white pelican	23	Poland: White stork
13	Bering Sea: Water birds	24	Manchuria: Eagle owl
14	Bahama Islands: Flamingo colony	25	Indo-China: Green peafowl
15-17	Guatemala: Forest birds; oropendula; and quetzal	26	Cameroon: Forest birds
18	Venezuela: Ibis and screamers	27	Senegal: Village weaver
19	Brazil: Water birds	28	Kalahari Desert: Desert birds
		29	Laysan Island group: Island birds
		30	New Zealand: Kiwi
		31	Antarctica: Emperor penguin
		32	East Africa: Nile marsh birds



MAP SHOWING FAUNAL AREAS OF THE WORLD

Numbers indicate the localities from which exhibits come

number of groups that are widespread north and south, but characteristic of either the Eastern or Western hemisphere.

In the Old World: Old World flycatchers (largely) and Old World warblers (largely).

In the New World: Wood warblers, tyrant flycatchers, and Icterine blackbirds (orioles, casiques, etc.).

And of course there are certain groups, which, while most numerous in one area or another, are widespread over much of the globe: grebes, herons, ducks, rails, hawks, certain owls, nightjars, and swallows.

Within the limits of any one region, and even in small areas within them, birds are not universally distributed. Some birds favor forests, some open ground, marsh, or sea shore. Each species usually requires slightly different food, shelter, and nesting place.

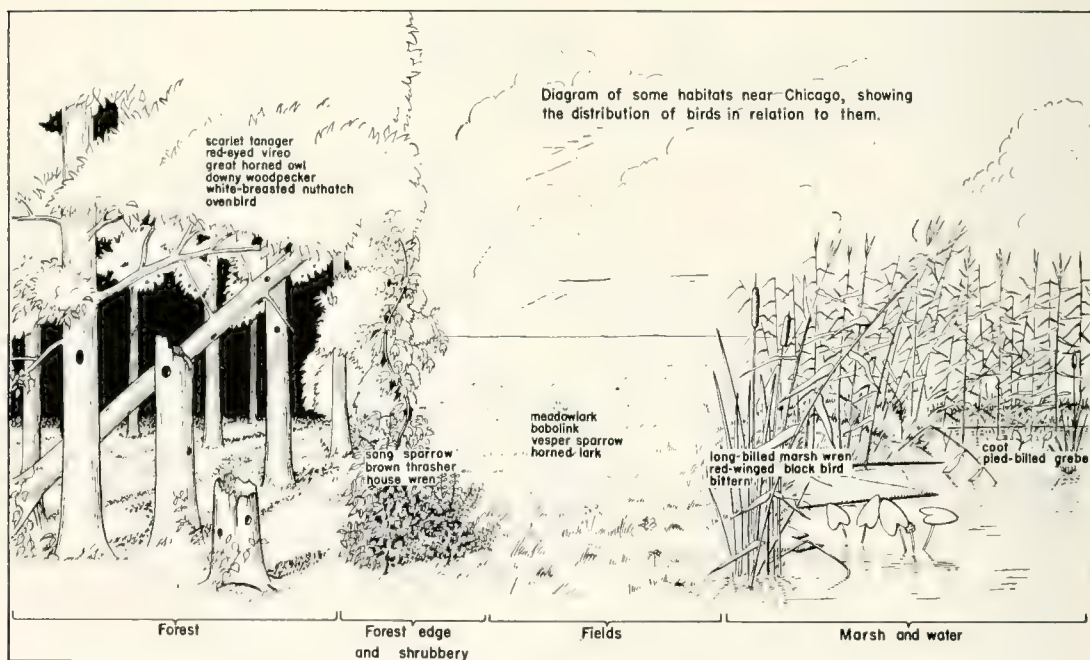


DIAGRAM OF SOME HABITATS IN THE CHICAGO AREA

HOLARCTIC REGION

In the far north, on the tundra, the birds of the New World and the Old World are much the same, especially the shore birds, ducks, gulls, and auks. In the northern forests, too, the same or closely related species are found in Siberia and Canada: three-toed woodpeckers, grouse, goshawks, ravens, jays, pine grosbeaks, and others. Farther south on each continent we get admixtures of birds derived from groups with more southern headquarters: in North America, such groups as hummingbirds, tyrant flycatchers, and American orioles; in the Old World, rollers, hoopoes, and bee eaters.

The differences between the birds of North America and those of Eurasia have caused some students to divide the area into two separate regions: Nearctic Region for North America (see pp. 20-50) and Palearctic for the Eurasian area (see pp. 51-58).



CHART ILLUSTRATING EXHIBIT OF MARSH BIRDS NEAR CHICAGO

1, 2. Red-wing blackbird (*Agelaius phoeniceus*)

3, 4, 5. Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)

6, 7. Black tern (*Chlidonias nigra*)

8. Bank swallow (*Riparia riparia*)

9. Florida gallinule (*Gallinula chloropus*)

10. Virginia rail (*Rallus limicola*)

11. Sora rail (*Porzana carolina*)

12. Coot (*Fulica americana*)

13. Least bittern (*Ixobrychus exilis*)

Marsh Birds Near Chicago

Marshes and the edges of ponds attract a host of breeding birds each year. In a group representing this habitat we have a typical aggregation of breeding birds on the shores of Fox Lake, in northern Illinois—a scene characteristic of much of the middle west during May and June.

Red-wing blackbirds are the most numerous and prominent of all marsh-dwellers in the Chicago area. The species occurs commonly from coast to coast in summer. Red-wings can be found wherever their nesting requirements are met by local conditions. The sexes are easily distinguished, for the male is black, with brilliant scarlet epaulets that are partly concealed when the bird is at rest, while the female is smaller, brownish, and streaked.

The size of the breeding colonies of red-wings is controlled largely by the size and composition of the marsh and the extent of the vegetation suitable for supporting their basket-like nests. Where cat-tails or marsh reeds are sparse, only a few pairs will be found; at other places, hundreds of nests may be found in a few acres. Male red-wings return to the north several weeks before the females. In the Chicago area the first individuals appear early in March. Thereafter the sloughs and marshes become alive with activity as the exuberant males sing and posture while establishing their individual nesting territories. A related western species, the yellow-headed blackbird, also occurs in the vicinity of Chicago. It, too, is a marsh bird, but it seeks larger, deeper marshes and is much less numerous in this area. An adult male, and a female feeding its young, are shown in the right foreground of the exhibit.

Florida gallinules and several rails also nest commonly in marshes of the middle west. Rails are among the most difficult of all birds to observe, since they are both obscurely colored and furtive in habit. Ordinarily they skulk among the stems of rank, water-side vegetation and are rarely seen, although the marsh may ring with their calls. Two common species are shown in the exhibit. An adult Virginia rail followed by four newly hatched young may be seen crossing the mud flat near the center of the case. As with most birds of related families, the young, down-covered rails leave the nest soon after hatching. A sora rail appears near the front of the exhibit. It is easily distinguished from the Virginia rail by its much shorter bill.

Several other common marsh-dwellers may also be found in this exhibit. A female least bittern crouches over its five eggs in a nest obscured by the thick vegetation at the right. The more brightly colored male clings to a reed near-by. This species is among the smallest of all herons. It is more elusive than most, however, and rarely leaves the security of dense marsh vegetation except during migration. A bank swallow soars over the pond in the center background, while overhead several black terns hover above a nest placed on the mud flat. Unlike most terns, this species prefers small ponds and marshy prairie-lands for nesting, often placing the eggs on floating logs or other vegetation. In the exhibit a bird in white, sub-adult plumage darts above the reeds.



Exhibit in Chicago Natural History Museum

Illinois Winter Birds

Well over 300 kinds of birds have been reported in the vicinity of Chicago at one season or another. About 60 of these occur during the winter. Eleven of the most common species that winter in the Chicago region are shown in an exhibit that depicts a typical Illinois countryside in midwinter.

Wintering birds of the northern states may be separated into two distinct groups. One group is composed of resident species represented in the Chicago area by birds like screech owls, hairy woodpeckers, horned larks, crows, bluejays, chickadees, and white-breasted nuthatches. These are found throughout the year, but their abundance often varies considerably with the seasons. Many individuals of such species that nest in the north wander this far south in the winter and increase the local population of residents; others that nest in the Chicago area often virtually disappear in periods of severe weather, although the species are still represented locally by hardy individuals.

A second group of birds that winter in the Chicago area consists of more northern species that migrate southward more or less regularly each year. Some, like the snow bunting and the northern shrike, are only occasional visitors and usually are absent during mild winters. Others, of which juncos, horned larks, and redpolls are good examples, arrive from the north regularly each fall and remain until spring.

Crows are conspicuous much of the year but during the breeding season they are relatively silent and furtive, particularly when near their nests. These bulky structures of sticks and twigs are placed well above the ground in forest trees. They are not readily found in summer, but are conspicuous after the leaves have fallen.

When the young have left their nests, crows assemble in great flocks that may include thousands of individuals. They range the countryside in noisy bands by day.



CHART ILLUSTRATING EXHIBIT OF ILLINOIS WINTER BIRDS

- | | |
|--|--|
| 1. Hairy woodpecker (<i>Dryobates villosus</i>) | 8. Blue jay (<i>Cyanocitta cristata</i>) |
| 2. White-breasted nuthatch (<i>Sitta carolinensis</i>) | 9. Northern shrike (<i>Lanius borealis</i>) |
| 3. Screech owl (<i>Otus asio</i>) | 10. Redpoll (<i>Acanthis linaria</i>) |
| 4. Crow (<i>Corvus brachyrhynchos</i>) | 11. English sparrow (<i>Passer domesticus</i>) |
| 5. Black-capped chickadee (<i>Parus atricapillus</i>) | 12. House mouse (<i>Mus musculus</i>) |
| 6. Horned lark (<i>Otocoris alpestris</i>) | 13. Cottontail rabbit (<i>Sylvilagus floridanus</i>) |
| 7. Snow bunting (<i>Plectrophenax nivalis</i>) | |

Each evening the foraging flocks may be seen converging on some established woodland roost where hundreds and even thousands of individuals may pass the nights together. Crows are at all times great enemies of owls and never fail to chase and harry one when they find it. In the exhibit a screech owl is taking refuge from pursuing crows and jays in a hollow tree.

One of the rarer and more interesting winter visitors is the northern shrike. Shrikes, which have powerful beaks provided with a hooked tip, feed on insects, small birds, and rodents. Their prey is commonly impaled upon thorns and on the barbs of barbed wire fences, where uneaten portions may often be found. Near the front of the case a northern shrike is eating a slate-colored junco, while near-by there is a redpoll that was previously killed. A smaller species, the migrant shrike, which has similar habits, breeds in the Chicago area, but it is not found in winter.



Exhibit in Chicago Natural History Museum

Winter Birds of Lake Michigan

Winter birds in northern latitudes are hardly less interesting than those of other seasons. True, the dynamic activity of the breeding and migration periods is ended or curtailed, but with the advent of inclement weather new associations of bird life are formed, the use of special adaptations is more evident, and various more northern species congregate in great numbers.

The seasonal distribution of many birds is strongly influenced by Lake Michigan and similar large bodies of water. Inland lakes as well as the northern sea coasts are the winter haunts of countless ducks and gulls driven southward by the approach of freezing temperatures. Every fall the Chicago lake-front is visited by migratory waterfowl en route to wintering grounds in the south. Some hardier species, like the Canada goose, the baldpate, the ring-necked duck, the canvas-back, the scaup, and the bufflehead, usually linger until late October or November before continuing southward. In mild winters a few individuals may remain until spring.

Other northern waterfowl regularly winter in great abundance in the Chicago area. Each year from November onwards thousands of American and red-breasted mergansers, old-squaws, and American golden-eyes enliven the lake-front during even the

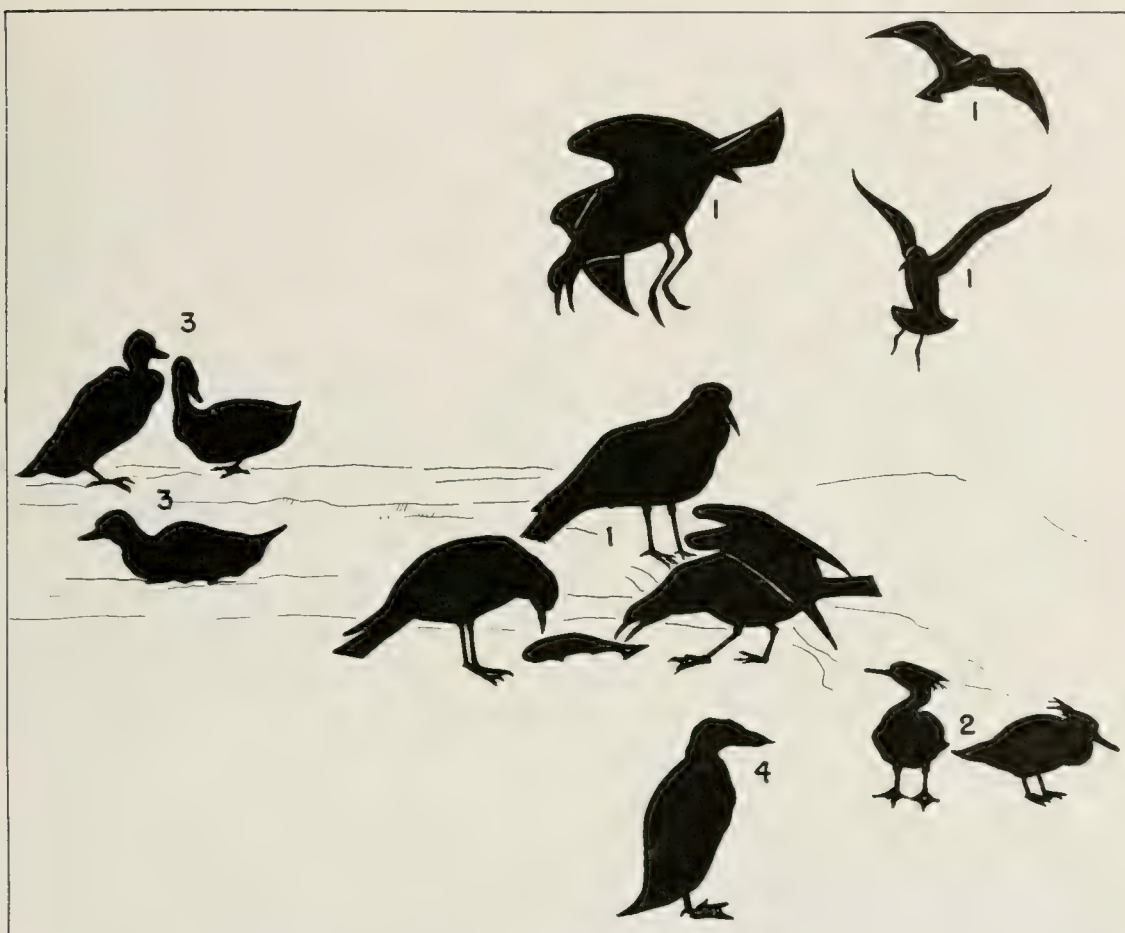


CHART ILLUSTRATING EXHIBIT OF WINTER BIRDS OF LAKE MICHIGAN

- | | |
|--|---|
| 1. Herring gull (<i>Larus argentatus</i>) | 3. Old-squaw (<i>Clangula hyemalis</i>) |
| 2. Red-breasted merganser (<i>Mergus serrator</i>) | 4. Surf scoter (<i>Melanitta perspicillata</i>) |

most severe weather. When ice forms near shore, flocks of these hardy birds form floating rafts on the open water beyond the floes. At other times, especially when the lake is lashed by severe storms, thousands of waterfowl crowd inshore. Many seek protection in lakeside lagoons within a stone's throw of the city traffic. Occasionally, such rarities as eiders, scoters, Barrow's golden-eyes, and harlequin ducks are also seen.

Ring-billed and herring gulls are no less characteristic of the lake front in mid-winter. Both species nest to the northward, but some individuals of each may be found locally throughout the year. After the breeding season these gulls move southward, but great numbers remain in the Chicago area. At this season, of course, many wintering birds are in drab, first-year plumage, although fully adult in size. The noisy, whirling flocks that scavenge the winter-bound harbors and the inland garbage dumps throughout the daylight hours are a constant reminder of the abundance of local bird-life even in midwinter.

American Cranes

Many of the "cranes" or "blue cranes" reported by country people are what the bird students call "great blue herons." But cranes do occur in the Chicago area, or at least they did so formerly; now one species is on the verge of extinction and the other is rarely seen here. Our exhibit, a scene at Deep River, Indiana, shows the two species: the white birds are the nearly extinct whooping crane, with a mottled young of the year; the gray bird is a sandhill crane.

The whooping crane has been called one of the most stately and most striking of our North American birds. Its original breeding range was chiefly the central plains and prairies of the United States and Canada, country that now is largely settled. Originally these cranes were abundant, but in 1876 E. W. Nelson had already noted a decrease in their numbers in northeastern Illinois, and wrote "once an abundant migrant." With the settling of the country the survival of such a large, striking bird, one that was good to eat, and that visited grainfields, became difficult. This species has decreased in numbers until now it is known only from the two dozen or so of individuals that winter on refuges in the Gulf of Mexico area. There are occasional recent records of birds on migration seen in Saskatchewan, but where they nest we do not know. Their foothold on existence is precarious, and extinction looms ahead.



Exhibit in Chicago Natural History Museum

The whooping crane is so called from its voice. Its calls have been likened to whoops or trumpet calls, far-carrying and audible at a distance of three miles. The greatly elongated windpipe, which is coiled in the breast bone, probably serves as a resonator. This crane formerly nested on raised mounds, such as old muskrat houses, in our prairie sloughs. Then it was conspicuous, giving its nuptial dance, a stately



thing of bowing, capering, flapping and trumpeting, the performance visible for a mile or two.

Though this species has been a victim of civilization, retreating before its spread, Seton records an extraordinary occasion when a crane struck back. An Indian hunter crippled one of these cranes and brought it to earth; but when he reached out to seize the wounded bird it drove its bill into his eye, piercing his brain, and the body of the hunter fell on that of his victim.

The sandhill crane is less striking than the whooping crane, but it, too, is a tall and stately bird. With a wider range, from Florida and our own prairies northward to the Arctic tundra, it still exists in numbers. The subspecies that formerly nested on the prairies, even in the Chicago area, is much reduced in numbers, but in Alberta and British Columbia the migrations of these beautiful birds to and from their nesting grounds in the northwest, from Mackenzie to Alaska, is still one of the thrilling sights of nature. In the air, cranes are readily distinguished by their extended necks—herons fly with their necks retracted. With their clear, carrying calls, flock after flock announce their arrival as they pass in formation high overhead. The hostility they meet on the prairies, where they walk about in the grainfields and pull up and eat roots, reportedly to the detriment of the crops, is part of the reason why the nesting birds of the prairies, both whooping and sandhill cranes, have had to retreat, along with the buffalo and the Indian, before the plow. Now the Chicago bird student rarely sees a crane.



Exhibit in Chicago Natural History Museum

American Herons

With slow, heavy wing beat, the great blue heron can be seen moving high in the air from feeding to nesting grounds in summer in the Chicago area.

It is a "still fisherman," standing perhaps up to its belly in the water patiently waiting for some unwary fish to come within striking distance of the spear-like bill, or slowly walking about in the water with a care and a stateliness that verge on the ludicrous. It feeds in streams and ponds and marshes. How different is its choice of nesting site! It is solitary as a fisherman, but when it comes to nesting it is gregarious. The birds make their nests in a single grove of trees, and such an inhabited grove is referred to as a "heronry." The highest trees are sought, and the stick nest is made in the topmost boughs. From three to six or seven (usually four) greenish eggs are laid.

The young hatch as feeble and helpless creatures. For some time they are fed in the nest by both parents, first on regurgitated fish, then on fresh fish, and a heronry becomes a smelly place. In the latter part of the season it is noisy too, for the young birds,

as yet unable to fly, clamber about in the branches and add their squawks to those of the parents. Herons, like most birds, are highly adaptable, using what is available, and while in the Chicago area they nest high in tree tops; where there are no trees they may nest in bushes or even on the ground.

In the bush in the right foreground of the group is a little green heron on its nest. It contrasts with the great blue heron in a number of ways, being much smaller, less shy, much more active, and more often hidden in shrubbery or reeds. It has catholic tastes in food, eating, amongst other things, minnows, crayfish, frogs, grasshoppers and cutworms. It often walks along until it sees its prey; then it crouches down and approaches stealthily until it is within range, when the neck that has been folded up snaps out its full length to drive the bill forward into the prey.

In nesting, this bird is adaptable, sometimes nesting high, sometimes low—even on the ground; sometimes it nests singly, sometimes in colonies, but rarely with other species. The pale green eggs are usually four or five in number. They hatch in about seventeen days. At an early age the young climb about among the branches. When young herons are approached they have what is to us a most disgusting method of defense, for they regurgitate the contents of the stomach.

Though the scene of the present exhibit is in Michigan, both species of heron and the male wood duck in the foreground are common in the Chicago area. No less than eight other species of herons have been recorded here.





Exhibit in Chicago Natural History Museum

Common Loon

The loon's loud laughing cry is the personification of the wilderness to many vacationists who spend their summers in the "north woods" of the Canadian zone, where conifers are the dominant trees and the whole country is dotted with little lakes.

There are four species of loons, and they are all northern in distribution; three nest in the Arctic tundra; the common loon, the subject of our exhibit, is the most southern species, and is shown near the southern edge of its range in Michigan.

The loon flies well, with a strong direct flight when it is finally air-borne after a long spattering run over the surface of the water. On the land it is at a decided disadvantage. It hobbles along; its feet being at the rear of its body are aided by the use of the wings as crutches; even the bill may be used to assist in locomotion on land. It seldom goes far from the element in which it is really at home, the water. Its nest is placed on

the shore, preferably on an island, where the brooding bird can slip directly into the water. Sometimes, at least, loons sleep on the beach. In swimming and diving the loon is probably excelled by no other bird. It swims under water, using both feet and wings to speed its progress. It has been taken on a set hook at 90 feet below the surface of the water, and dives of 69 seconds have been recorded. It is reported to out-distance a boat with two men rowing, and even an "ordinary motorboat."

The loon arrives in the north country soon after the ice breaks up in the spring. Two eggs are laid in the crude nest, as is shown in the exhibit, and when the downy young are hatched they are very precocious. They follow the parent shortly after hatching, and catch fish for themselves within a week. During the nesting season each pair is solitary, but in late summer and early fall, when the young are well grown, a number may gather together and indulge in what seems to be a wild frolic, running over the surface of the water with wings partly spread, and giving wild cries. With the freezing of the small lakes the loons move out, some to the Great Lakes, some to the ocean. Though the common loon nests only in the northern part of the New World, it winters on the European coast as far south as Britain, as well as on our coasts. It is then more gregarious and gathers in small scattered parties; flocks of up to forty or more may be seen.

The food of the loon includes much fish, but it eats other aquatic animals, such as crustaceans, mollusks, and insects. Some loons breed on fishless lakes, so they must either fly to fish-inhabited lakes, or feed on other things. Loons have been accused of being enemies of small ducklings, but this charge does not appear to be substantiated.

In the coniferous forests where the loon nests, the bird neighbors vary with the locality, but some of the more characteristic are wood warblers such as the myrtle and



the blackpoll, the white-throated sparrow and the hermit and olive-backed thrushes, the Canada jay, the raven, the goshawk, the kinglet, and the olive-sided flycatcher. In the group there is shown, besides the loon, a yellow-bellied sapsucker on a white birch, and a hooded merganser behind the dead log on which a painted turtle is resting.



Exhibit in Chicago Natural History Museum

Ruffed Grouse

The muffled roll of the drumming of the ruffed grouse is one of the stirring songs of the spring woods. Occasionally in autumn the drumming sounds through thicket and copse, but then it is only a chance and fleeting thing. The drumming is the spring song of the grouse, a song mechanically produced. How the grouse made this noise was long a disputed question, but Dr. A. A. Allen settled it by taking motion pictures of a bird in action and analyzing them. The sound is produced by the bird's wings striking the air. Sitting on its display log, the bird moves its wings upward and forward, slowly, then faster and faster, until they disappear in a blur, as the thumping blends into a roll.

The female, hearing the song, comes here to mate, and a display takes place. Puffed up like a miniature turkey gobbler, the cock grouse, with ruffs erected, tail raised and spread, and wings drooping, displays to the female. After mating, the

female leaves the male and carries on the rest of the family duties by herself. The nest, usually in woods or brushland, is simply a little depression in the ground. It has a scant lining of whatever dead leaves are at hand. From nine to a dozen buffy eggs are the usual clutch. After about three weeks of incubation the young hatch, and as soon as they are dry, they follow the parent, leaving the empty eggshells in the nest.

The “broken-wing” or “cripple-bird” ruse of the female grouse to draw an enemy away from her young has puzzled many a predator and roused the admiration of many a nature student. When an enemy approaches the little brood, the female may rush at it, every feather on end until she appears twice her normal size. If this is not successful in scaring away the marauder, she may start to flutter and limp away, apparently a cripple to be had for the catching. But when she has thus led the enemy far enough from her brood, she collects herself and whizzes away and disappears. The young, meanwhile, have been crouching motionless in response to a warning cluck from the mother, their pattern of buff and brown harmonizing so well with the dead leaves of the forest floor that only a very careful search will find them.

The grouse seems an opportunist in its feeding. The list of seeds it has been found to eat occupies a column more than three inches long in Bent’s *Life Histories*. It also eats leaves, picking one here, one there, as it goes along; whatever insects come its way seem to be picked up, and in winter, when everything else is snow-covered, the birds perch in trees and eat the buds of birch and aspen.

In the autumn the grouse is hunted as one of the finest of game birds. Often it is in small parties, feeding in an old orchard, or in a buckwheat field near a wood, or in a hedgerow. It springs into flight with a roar of wings and twists and bores through the bush, often putting a dense tree between itself and the gunner.

Its range is rather northern, from New England to British Columbia, though it ranges farther south in the mountains. Formerly, at least, it was listed as an uncommon bird of the Chicago area.



Exhibit in Chicago Natural History Museum

Wild Turkey

This is a real American, found in a wild state only in North America. "In the days of the Pilgrims and Puritans the Thanksgiving turkey was easily obtained almost everywhere in the surrounding forest; the delicious meat of the wild turkey was an important and an abundant food supply for both Indians and settlers; and the feathers of the turkey held a prominent place in the red man's adornment."¹ Originally turkeys were found north to Maine and Ontario, and were "formerly plentiful" in the Chicago area. Though the turkey has disappeared from the northern part of its range as a wild bird, it has been successfully domesticated and now the Christmas and Thanksgiving turkeys come from a poultry farm.

The wild turkey is a magnificent bird, with a superb bronzy plumage. The adult male reaches a length of about four feet and a weight of forty pounds. In the habitat group we show a characteristic flock of males and females in the hardwood forest of the eastern United States in which the turkey makes its home. It feeds on a variety of things, including nuts, fruits, seeds, leaves, and grasshoppers, which it picks up as it walks about. It can run very rapidly and travels long distances on foot. This it ordinarily does to escape danger, but it is also a strong flier, and in flight looks like a huge grouse.

¹ A. C. Bent, *Life Histories of North American Gallinaceous Birds*. 1932.

In the spring, at courting time, the gobbler expands his body plumage, erects and spreads his fan-like tail, swells up the naked head ornaments, and with drooped wings struts and rattles the wing feathers and gobbles to attract and impress the female, as does the familiar barnyard turkey. He is polygamous and displays during the spring season at his chosen post, where he is visited by successive females.

The female steals away to make her solitary nest. This consists simply of a few leaves in a hollow on the ground, by some log or thicket. In it she lays her eight to fifteen pale buffy or pinkish eggs, which she incubates for twenty-eight days. The down-covered chicks follow the female as soon as they are dry after hatching. For the first fortnight she broods them at night, on the ground, but after that, when night comes, they fly to some low branch with the parent and huddle beside her. In the autumn the birds assort into new flocks, the females, the young males, and the old gobblers joining their separate bands.

In colonial days large numbers of wild turkeys were captured in a simple, ingenious trap. A crude log cabin was made, leaving chinks open between the logs, especially in the roof. Then an entrance was made by digging a trench down to and under the log wall and up inside the trap. Corn was scattered about outside the trap and a trail of corn was laid in the trench and into the trap, where an abundant supply was placed. The turkeys followed the trail of grain in the trench, under the wall, and into the trap. Finally, replete, they tried to find their way out but they never stumbled on the expedient of ducking out the downward way they had come in.

Formerly, at least, the sportsman with his gun, and perhaps before him the Indian with his bow and arrows, used to decoy turkeys within shooting range by imitating the turkeys' calls in the mating season. In this it was not the skill of shooting or stalking that was important, but the choice of a place from which a turkey would be likely to call, with sufficient cover to hide the hunter. There he had to remain still enough so as not to be seen by the bird, and finally, with the aid of a leaf, or the wing bone of a hen turkey, he had to be able to imitate the call of a gobbler ("talk turkey") so that the male was deceived into approaching a prospective mate or a potential rival.



Golden Eagle

Two species of eagle, the golden and the bald, inhabit North America. Both have extensive ranges and may be abundant locally or during migration. Of the two, the bald eagle is much the better known. It occurs in suitable habitats from Florida to Alaska and, as our national symbol, is generally regarded with respect and admiration. Although capable of catching birds in flight, bald eagles feed principally upon fish and usually are found near large bodies of water.

The larger but less colorful golden eagle is in many respects the more interesting of the two. Unlike the bald eagle, it ranges far beyond this continent and is actually circumpolar (Holarctic) in distribution. A single form is known in North America, but several geographic forms have been described from the north temperate zone of Europe and Asia. All, however, are characterized by heavily feathered lower legs (tarsi) and rich brown plumage. The golden-brown tone or sheen from which the golden eagle gets its name is acquired only when the bird is fully adult.

Golden eagles are inhabitants of mountainous regions and arid, barren wastes. In North America they are resident only in the west, but each year during migration, stragglers are observed eastward as far as the Alleghenies in Pennsylvania. During late fall the species is reported occasionally in the vicinity of Chicago. More often than not, however, these birds have proved to be bald eagles in dark immature plumage.

During the breeding season golden eagles are uncommon east of the Rockies. They usually nest in remote areas, preferably on a rocky crag or an inaccessible ledge of a canyon from which much of the countryside may be seen. As with all eagles, the eyrie or nest is a bulky affair of sticks and branches lined with leaves and twigs. Golden eagles probably mate for life, and the same nest may be used year after year. As the old nest is repaired each season, it gradually increases in size and may finally attain a depth of eight feet.

The breeding habits of golden eagles have been described by Mr. Rudyerd Boulton, former Curator of Birds, as follows: "The eggs are two in number, occasionally three, and are white, attractively shaded and blotched with pinkish brown. It not infrequently happens that one egg is infertile and fails to hatch. If both eggs hatch, one of the youngsters is invariably larger than the other because the eggs are laid at an interval of about a week and the first-born gets a start on its nest mate. And thus it happens that often only one bird is brought to maturity, for the elder and stronger may tear its weaker brother to bits in sheer exuberance of living.

"Eaglets are clothed in thick, soft, white down when they hatch. They wear this coat for about three weeks. Then comes a period of about two weeks while their feathers are growing, during which time they are ragged, pathetic-looking creatures. They remain in the nest for another three weeks—two months in all—while they gain strength and confidence to venture into the exciting and strenuous world."

A reliable eyewitness in California states, in describing her observations of an eagle teaching its youngster to fly, that the mother would force the young one from the



GOLDEN EAGLE

Exhibit in Chicago Natural History Museum

nest in the crags and allow him to drop about ninety feet. Then she would swoop down under him, wings spread, and he would alight on her back. She would soar to the top of the range with him and repeat the process. The farthest she let him fall was about 150 feet.

Golden eagles prey largely on mammals. Rabbits and ground squirrels comprise their principal fare, but lambs and even deer and antelope may occasionally be killed. Nevertheless, the good they do counteracts the bad, and it would be most unfortunate to lose so majestic a bird from our avifauna.



Exhibit in Chicago Natural History Museum

Canadian Water Birds

The scene is in Saskatchewan; the locality, Quill Lake. After travelling over the prairie grasslands, where the species of birds are scant and individuals are few—a few horned larks and longspurs, with savanna sparrows, vesper sparrows, and meadow-larks here and there—the abundance of nesting water birds about a prairie slough and the clamor of their voices are almost incredible. The continual scolding of willets, the cries of gulls and terns, and the whistling wings of ducks that keep flying about overhead are bewildering.

About a prairie slough thousands of ducks are sometimes in sight at one time: mallards, pintails, green-winged teals, blue-winged teals, baldpates, gadwalls, redheads, canvasbacks and lesser scaups in great numbers. If there is a reed bed in the slough, red-winged blackbirds and yellow-headed blackbirds, long-billed marsh wrens and Maryland yellow-throats may nest there, and perhaps a colony of Franklin's gulls. As many as 2,000 nests of eared grebes have been estimated on one slough; ring-billed and California gulls are numerous; black terns hovering over the edge of the water are characteristic; and here and there are common terns. An intruder walking along the water's margin is continually scolded by the noisy willets and marbled godwits flying about and by killdeer and spotted sandpipers running along ahead.



CHART ILLUSTRATING EXHIBIT OF CANADIAN WATER BIRDS

- | | |
|--|--|
| 1. Willet (<i>Catoptrophorus semipalmatus</i>) | 7. Blue-winged teal (<i>Querquedula discors</i>) |
| 2. Franklin's gull (<i>Larus pipixcan</i>) | 8, 9. Ring-billed gull (<i>Larus delawarensis</i>) |
| 3, 4. Common tern (<i>Sterna hirundo</i>) | 10, 11. Lesser scaup duck (<i>Nyroca affinis</i>) |
| 5, 12, 13. Pintail (<i>Dafila acuta</i>) | 14. Marbled godwit (<i>Limosa fedoa</i>) |
| 6. Baldpate (<i>Mareca americana</i>) | 15. Canada goose (<i>Branta canadensis</i>) |

These are, or perhaps one should say were, bird-paradises, for a number of serpents have gotten into this Eden. With the introduction of wheat-growing, land was plowed to the edges of the sloughs, so that the nesting ducks there were disturbed. Some of the sloughs were drained. Cattle grazing over the plains came to the water to drink, and by trampling the ground, further added to the difficulties of the nesting birds. Even nature seemed to conspire against them, for a long dry period in the 1930's still further reduced the habitat available for water fowl. Botulism, a disease correlated with certain water conditions, also took its toll. These factors, plus the shooting of ducks, have decimated the flocks in areas once teeming with ducks.

Fortunately, public and private enterprises are at work putting water back into the sloughs and rehabilitating the prairie duck-habitat; and we have adequate control of shooting. All in all, with proper care, we shall continue to have our myriads of marsh birds on the prairie.



Exhibit in Chicago Natural History Museum

White Pelican

Along with the widespread prairie marsh birds we have two prominent species that, while not everywhere common, nest in large numbers here and there on the prairie sloughs. These are the white pelican and the double-crested cormorant. These are also shown in Saskatchewan on Quill Lake.

The summer home of the white pelican is on the lakes of interior North America. It nests on the ground, preferring little islands in lakes. When the two young hatch, they are naked, blind, and helpless. Until they are about half grown they are fed on regurgitated fish, which they get by thrusting their heads down the throat of the old bird. This seems a reversal of the usual feeding of young by birds, in which the parent places the food in the mouth of the young and often thrusts its bill into the expectant throat.

Not until the young are about half grown and covered with down do they begin to wander about on their island home and learn to swim.

White pelicans are magnificent and impressive birds. In swimming they float high, like a cork; in flight, they travel with slow measured strokes, or soar, even in strong winds.

The white pelican is one of our largest birds, with a weight of up to twenty pounds, and a wing spread of up to ten feet. One would expect nothing but stately movements



CHART ILLUSTRATING EXHIBIT OF WHITE PELICAN

- | | |
|--|--|
| 1. White pelican (<i>Pelecanus erythrorhynchos</i>) | 3. Franklin's gull (<i>Larus pipixcan</i>) |
| 2. Double-crested cormorant (<i>Phalacrocorax auritus</i>) | 4. Common tern (<i>Sterna hirundo</i>) |

in such a large bird, and yet at times these birds perform amazing evolutions over their marshes, soaring up, diving, and zigzagging over the tules with amazing agility.

Their food is fish, which they catch by swimming along the surface, or wading in shallow water, and scooping the little fish up in their pouches.

White pelicans are gregarious, usually gathering in flocks, and communal efforts have been recorded in their fishing. A whole flock of the birds forms into a line facing the beach, and with splashing of wings and ducking of heads they advance toward the land, driving the fish before them and filling their pouches as they go.

In winter the white pelican moves to the warmer sea coast, where in the Gulf of Mexico and on southern California coasts and southward, it consorts with its smaller relative, the brown pelican.

Often on the prairie lakes double-crested cormorants nest along with the pelicans. They're actually closely related to the pelicans, despite the difference in appearance.

While the white pelican is restricted in the kind of place it nests, the cormorant is adaptable. In the Museum group we see it nesting on the ground by a prairie lake; in Florida it nests in the tops of trees; and in the Gulf of St. Lawrence it nests on the sea cliffs and gathers fish in salt water.



Exhibit in Chicago Natural History Museum

California Condor

California condors have many claims to distinction. They are the largest of all the birds of prey, with the possible exception of a related species that inhabits the Andes of South America. Few birds of flight, in fact, exceed these great vultures in size. A mature individual weighs about twenty-five pounds and may have a wing spread measuring as much as eleven feet.

The recorded history of the California condor, unfortunately, is similar to that of various other birds that have been decimated by man in recent decades. The species formerly ranged throughout the west from British Columbia south to Lower California, and eastward to Alberta and New Mexico. Fossil remains from St. Petersburg, Florida, indicate an even wider distribution in prehistoric times. Although never so abundant as other vultures, California condors were by no means rare west of the Rocky Mountains during the early pioneer years when scores of individuals often gathered about a hunter's kill.

California condors became increasingly rare after the middle of the last century. Many were killed by early prospectors who found that the hollow wing quills made convenient containers for gold dust. Frontiersmen shot countless others for sport, and many were destroyed by poisoned meat intended for animal predators. Within a few

decades this magnificent species disappeared over most of its original range. By 1910, the few survivors had taken refuge in the most inaccessible parts of the south-central coast ranges in California. Condors are now strictly protected. A recent survey (1953) by Karl B. Koford estimates that only about sixty condors remain alive. These are in a small area in California.

Breeding condors frequent the most remote areas, and their nesting sites are seldom found. A single whitish egg is deposited in March or April on the bare rocks of a ledge or cave that usually is inaccessible to man. Incubation requires about thirty days. The fledgling is first covered with thick white down that is later replaced by gray down. The first feathers appear during the fourth month, and the young bird is able to leave the nest site when about six months old. The retarded breeding cycle of condors largely accounts for their slow recovery as a species, even though they are now rigidly protected.

Like all other vultures, condors feed principally on carrion, which they detect by sight. Although birds of powerful flight, condors have feet and claws ill-suited for grasping. They are incapable of capturing live prey, or even of lifting much weight from the ground. Nevertheless, their muscular power is phenomenal. On one occasion four birds managed to drag the carcass of a young grizzly bear several hundred yards.





CHART ILLUSTRATING EXHIBIT OF BERING SEA BIRDS

- | | |
|---|--|
| 1. Pallas' murre (<i>Uria lomvia</i>) | 4. Glaucous-winged gull (<i>Larus glaucescens</i>) |
| 2. Red-faced cormorant (<i>Phalacrocorax urile</i>) | 5. Horned puffin (<i>Fratercula corniculata</i>) |
| 3. Kittiwake gull (<i>Rissa tridactyla</i>) | |

Bering Sea Birds

One of the most populous "bird cities" in the world is located on Walrus Island, smallest of the four that form the Pribilof group north of the Aleutians. This barren rock, a mere speck in the vastness of the Bering Sea, lies far beyond the reach of predatory land animals. Each year it serves as a safe refuge for incredible numbers of nesting sea birds. At the height of the breeding season it is estimated that about nine million birds of a dozen species are crowded together on this tiny islet.

Regarding the birds that form this teeming metropolis, Rudyerd Boulton has written as follows: "One of the most abundant birds on Walrus Island is Pallas' murre, western representative of the better-known Brunnick's murre of the Labrador coast. Murres are highly gregarious birds, especially during the breeding season. They crowd together in huge companies, yet the rights of individuals are strictly preserved. If an intruder trespasses on this few square feet which each murre family regards as its own home and personal property, a fierce battle invariably results. Biting and buffeting with wings, the combatants roll and tumble, creating disorder and dismay among



Exhibit in Chicago Natural History Museum

BERING SEA BIRDS

their neighbors. So intent are they in the conflict that not infrequently they roll off the cliff, and, still fighting as they fall, are dashed to death on the rocks beneath their nesting ledges.

“Murres build no nests whatever, laying their eggs on the bare rock. Large gulls often steal and eat the murres’ eggs when they find them unprotected. The eggs are pear-shaped so that when disturbed they roll in a small circle. This curious adaptation doubtless prevents many eggs from rolling off the cliffs during the frequent battles or because of the somewhat awkward movements of the adults.”

All of the twelve species that breed on Walrus Island are sea birds. Murres considerably outnumber all others, but the summer population also includes other interesting species with similar breeding requirements. In the center of the island there is an area of scanty grass occupied by the nests of glaucous gulls, a powerful, predatory species that preys on the eggs and young of other birds when left unguarded. In the exhibit may also be seen red-faced cormorants, glaucous-winged gulls, Pacific kittiwakes, and clown-like horned puffins. Other residents of this amazing bird metropolis, not shown in the exhibit, are the tufted puffin, the crested parakeet, the least auklet and the red-legged kittiwake.

Birds of the Hawaiian Islands

The Hawaiian Archipelago includes such outlying islets as Laysan, which is the scene of the sea-bird group that represents this fauna in our hall. The habitats are varied—sandy islets, larger islands with sea beaches, bare lava flows, hot dry deserts, fertile valleys, marshy lowlands, grassy hills, wet forests, and bare snow-capped peaks. Isolated in the North Pacific far from any continent the islands have a truly oceanic fauna; all the animals arrived by travelling overseas, the land animals as waifs and strays—accidental colonists.

These colonists, once established in the isolation of their new island home, evolved into new forms, colonized other islands and evolved still more forms; so the process went on. The length of time the birds have been isolated is reflected in the degree of distinctiveness they have achieved. There is one endemic family (honey creepers, with about 45 species), obviously representing the oldest colonist; there is one endemic genus each of rail, honeyeater, thrush, flycatcher and goose; three endemic species—a crow, a hawk, and a duck; and four endemic subspecies—an owl, a stilt, a gallinule, and a coot. The most recent arrival is probably the night heron, which is still quite the same as the form on the mainland.

Colonization from across a wide sea has been difficult and has occurred only at long intervals. Thus the numbers of birds known in the archipelago is small; there are only 96 resident species (plus 8 regular migrants, 34 accidentals or of casual occurrence, and 94 introduced species). To consider the amount of endemism in another way, 77 of the 96 birds of regular occurrence are endemic, that is, found nowhere else.

From a study of the endemic birds, Mayr concludes there had been fourteen different colonizations. By studying the relationships of these birds it was possible to determine whence their ancestors, the original colonists, came; in eleven of the colonizations they came from America and only in two from Polynesia. Though the islands are in the Pacific, and the native people Polynesians, it appears the bird fauna must be grouped as predominantly North American.

The sea birds, mostly of more widespread distribution in the Pacific, will be discussed in connection with the Laysan Island exhibit below. The regular migrants, including three ducks and five shore birds, and the casuals and strays (thirty-four species) will not be discussed further. The endemic mountain birds and the introduced species will have a further word here.

MOUNTAIN FOREST BIRDS

In the mountain forests there are from 50 to 55 native perching birds. They include a crow, 6 thrushes, 3 flycatchers, 5 honeyeaters, and between 40 and 45 species of native honey creepers belonging to the peculiar Hawaiian family Drepaniidae.

The diversity of appearance in these drepanids has long attracted attention. In an isolated habitat, with many islands available for colonization yet providing the isolation needed for speciation, the originally single stock has evolved in many different directions. Colors are black, golden, red, green and yellow; bills vary from short, for insect-eating, to long and slender, for sipping nectar from blossoms; and there are some heavy, almost finch-like or parrot-like beaks, for cracking seeds. All are small birds of sparrow size.

EXTINCTION OF SPECIES

Many of the endemic species are gone—extinct. Bryan and Greenway (1944) listed about eight species of perching birds as extinct or probably so, and another ten as very rare or possibly extinct. This is a high proportion of the perching birds listed. It has been thought that feather hunters exterminated them or that they were chased away by the introduced minah bird or had their eggs destroyed by the introduced mongoose. But the real reason lies deeper. Settlers arrived. They cut down the forest and planted sugar cane and pineapples; they introduced cattle, pigs, and goats, which contributed to the damage of the forest and made the land vulnerable to erosion. Foreign plants and foreign birds were imported. With the habitats destroyed, some of the native birds disappeared; some still exist in the remaining restricted areas of forest.

FOREIGN BIRDS

In and about Honolulu it is not native birds that one sees, but introduced species. About 94 foreign species have been introduced, and about 53 have become established, according to Bryan and Greenway. They have been brought from many places: pheasants from Mongolia and Java; grouse and quail from America, China, and Australia; partridges from the Himalayas; doves and pigeons from Panama and Malaya. The skylark, the cardinal, the willie wagtail, the meadowlark and the minah illustrate the catholic taste in importation. And yet one wonders how much of the loss of the native birds could have been prevented. To grow food crops it was necessary to destroy forests, and when the forests were destroyed the forest birds went with them. Let us hope that forest preserves save the remainder from destruction.



Exhibit in Chicago Natural History Museum

Laysan Island Nesting Sea-Birds

Stretching westward from Hawaii is a series of widely scattered small islands and islets. Laysan Island, the scene of the present exhibit, is near the middle of this chain, about 800 miles from Honolulu. It is an atoll of about two square miles, with a characteristic central lagoon of perhaps 100 acres.

The sand, turf, and shrubbery of this tiny islet were renowned as a bird paradise, especially for sea birds: albatrosses, terns, boobies, frigate birds, tropic birds, and petrels. Fisher wrote that two things impressed him about the birds on Laysan: the first was their abundance, a population of two million birds having been estimated on this tiny islet; the second was their tameness and fearlessness.

Fisher wrote that the sea birds "seemed little put out by our presence and pursued their ordinary duties as if we were an essential part of the landscape. Even the land birds were fearless. While we sat working, not infrequently the little warbler, or miller bird, would perch on our table or chair backs, and the Laysan rail and finch (a drepanid honey-creeper) would scurry about our feet in unobtrusive search for flies and bits of meat. Each day at meal time the crimson honey-eater flew into the room and hunted for millers. As we strolled over the island the rails scampered hither and thither, like tiny barnyard fowls. As for the sea birds there was scarcely a species that seriously objected to our close approach, or at any rate departed when we attempted



CHART ILLUSTRATING EXHIBIT OF LAYSAN ISLAND SEA-BIRDS

- | | |
|--|---|
| 1. Laysan albatross (<i>Diomedea immutabilis</i>) | 6. Blue-faced booby (<i>Sula dactylatra</i>) |
| 2. Black-footed albatross (<i>Diomedea nigripes</i>) | 7 (Male) and 8 (female). Man-o'-war bird or frigate bird (<i>Fregata minor</i>) |
| 3. Christmas Island shearwater (<i>Puffinus nativitatis</i>) | 9. Gray-backed tern (<i>Sterna lunata</i>) |
| 4. White-breasted petrel (<i>Pterodroma leucoptera</i>) | 10. Noddy tern (<i>Anous stolidus</i>) |
| 5. Red-tailed tropic bird (<i>Phaethon rubricauda</i>) | |

to photograph them. In fact the albatrosses were astonishingly fearless and would sometimes walk up and examine some portion of our belongings as if they had known us always." As a man walks among them, the albatrosses scarcely step aside to let him pass; they may even peck at his trousers.

Two species of albatross dominate the scene. Albatrosses as a group (there are about thirteen species) are southern, but three belong to the North Pacific Ocean. Both the Laysan species are about as large as a goose, but they are not as large as the wandering albatross. This last, with a wing spread of up to 11½ feet and a weight of about eighteen pounds, is the largest flying bird, if we accept wing spread as the

criterion. Part of each year albatrosses spend all their time at sea, skimming the ocean in magnificent soaring flight or resting on it. At mating time they throng to a few tiny oceanic islands, as at Laysan.

The dance of the Laysan albatross, illustrated by the two birds standing breast to breast in the center of the group with their bills pointed skyward, is a remarkable performance, probably connected with courtship originally, though now it almost seems to be a pastime. "From a point of vantage, an observer may often see 25 or 30 couples all engaged in this performance at once." Fisher described the dance in part as follows: "Two albatrosses approach each other nodding solemnly all the time. Next they fence a little, crossing bills and whetting them together, pecking meanwhile, and dropping stiff little bows. Sometimes both birds raise their heads in the air and either one or both utter the indescribable and ridiculous groan." The sooty albatross has a modified form of the dance.

Relatives of the albatrosses are the petrels and shearwaters, which when not breeding are also birds of the open ocean, spending all their time at sea.

It is interesting to note the stratification of the birds, even in a place with such scanty vegetation: the frigate bird nest is on the shrubbery; the albatrosses, boobies, and tropic birds are among those that nest on the ground; and a petrel lays its egg underground.

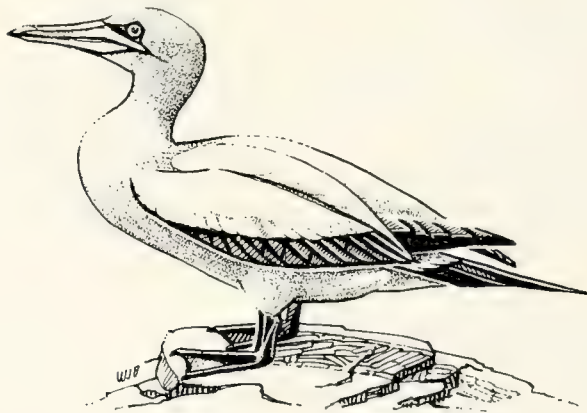




Exhibit in Chicago Natural History Museum

Red Grouse

The famous game bird of Scotland, the red grouse, is shown on a moor in Selkirkshire in late October, with the bird's fine winter plumage showing conspicuously against the snow. This contrast is surprising in a way, for the red grouse is closely related to the willow ptarmigan, the rock ptarmigan of circumpolar distribution, and the white-tailed ptarmigan of the Rocky Mountains, all of which assume a white, winter plumage matching the snow.

The heather-covered moors and peat bogs of Scotland are the chief home of the red grouse, but it occurs in England, too, and Ireland has a separate subspecies. In the spring, pairs are formed, preceded by a great deal of displaying, crowing, and calling. Then a nest in which from six to eleven eggs are laid is scraped out by the female. Many grouse are polygamous, like our ruffed grouse and prairie chicken, but in the red grouse the male stays with the female and guards the downy young, which are able to follow the female a few hours after hatching. In autumn and winter the birds gather

into flocks or "packs," which associations last until the following spring. Their food is largely vegetable, especially buds, shoots, and seed-heads of heather, but those who live where heather is absent must subsist on other food.

The red grouse is probably the most important game bird of the British Isles. Great estates are devoted primarily to grouse moors, and August 12, traditional opening day of the shooting season, has come to be regarded almost as a national holiday. Game-keepers and biologists have made exhaustive studies on how best to conserve the supply. They have seen that neither too few nor too many birds are left over for "seed" and have studied the effects of disease, cover, weather, and predators on the population.

"Driving," as it is called, has become the most popular method for shooting the birds. The gunners take up stations in prepared blinds or huts, and a line of beaters starts toward the gunners, frightening the birds into flight. The grouse are driven past the gunners, usually at full speed, offering a wide variety of shots.

Though only red grouse are shown here, the heathlands in Britain on which these grouse live may support a fairly heavy population of birds. In a study on a moor in Yorkshire, where the vegetation was mainly heather, with some grass and whortleberry, the breeding bird population on 144 acres was as follows: six twites (a relative of the redpoll), eight reed buntings, six skylarks, sixty-two meadow pipits, four song thrushes, two ring ousels, four wheatears, two winechats, two wrens, two merlins (pigeon hawks), two teals, fifteen golden plovers, eighteen lapwings, three dunlins, and eighty-two red grouse. The average was 151 adult birds to the 100 acres, or a bird and a half to the acre, according to the observer, David Lack.

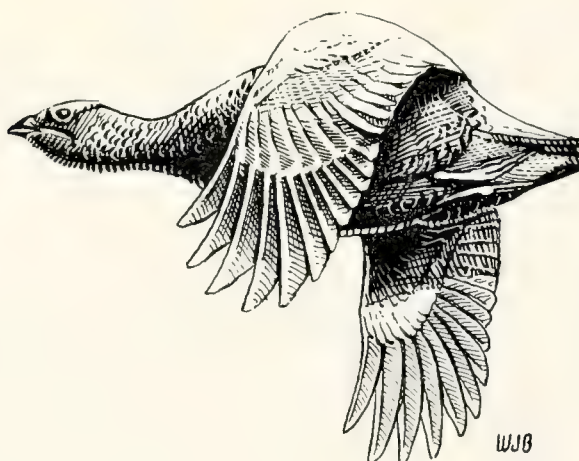




Exhibit in Chicago Natural History Museum

White Stork

The European white stork is a member of a family that has about seventeen species, all but three of which live in the Old World, from Europe to Australia and Africa. The so-called wood ibis of our southern states is in reality a stork. All storks are long-legged, tall, imposing birds. The white stork of Europe is perhaps the best known, but the marabou, with its scavenging habits, the saddle-bill stork, with its strange bill ornamentation, and the open-billed stork, strangely modified to get snails out of their shells, are also striking forms. The African whale-headed stork belongs to a related family.

The white stork has come to nest on the roof tops of its human neighbors, having deserted its original nesting habitat on trees and cliffs. Storks are not the only birds to take to human habitations, almost entirely forsaking their original habitat. The chimney swifts of the United States used to nest in hollow trees; now most of them probably nest in the chimneys erected by man, and it is an event to find one nesting elsewhere. The barn swallow finds its home inside the outbuildings of the farm and the cliff swallow outside; and the purple martin in the eastern United States has come to depend entirely on bird houses.

It is considered a good omen throughout central Europe to have a stork's nest on one's house. To encourage storks the householder may fix an old wagon wheel on the

roof, for a nest site. For centuries the stork has been celebrated in the literature and legend of Europe, and storks are protected not only by law but by the even more influential force of public opinion.

In the summer, in Europe, the storks seek their food, chiefly of frogs, in grassy fields and marshes, and are found singly or in small parties. But in the stork's winter home in Africa it masses into great flocks, sometimes following the swarms of locusts on which it then feeds and which give it locally the name of "locust-bird." Storks banded in Europe have been recovered in Africa. In South Africa, when the great flocks take off on their northward flight to Europe, a few weak individuals are sometimes left behind and stay there for the southern winter. Presumably it is these that have given rise to the belief that the storks nest both in Europe and in South Africa, but Austin Roberts, a student of South African birds, says definitely that they do not breed there.

The group shows a scene at sunrise in a little rural community near Krzemieniec, in southeastern Poland. In the foreground is the thatched roof-top of a cottage supporting a stork's nest containing two young storks. One of the parents stands on the nest offering a frog to the youngsters; the other parent solemnly stands near-by, sentinel-like. In the painted background are a number of cottages (one of which supports an additional stork's nest), and a church of the Greek Orthodox faith, with its characteristic steeple and Byzantine cupola. The rising sun, a golden half-disk on the horizon, casts a rosy glow over the scene. Although no people are about because of the early hour, wisps of smoke from the cottage chimneys forecast the day's activities. In the distant background are meadows and fields of grain, for in this part of Poland the farmers of a district gather in little communities for companionship, the cottages being placed close together while the tilled fields surround the village. At one side of a winding road is a shrine, without which no Polish village would be complete.





Exhibit in Chicago Natural History Museum

Ruff

The ruff and his mate, the reeve, are shorebirds, relatives of sandpipers, of Europe and Asia. The male is remarkable for the ruff of elongated feathers which give him his name and which he dons only for the breeding season to use in his courtship display. The variation of the color and markings in the ruff is extreme; the ornamental feathers may be black, chestnut, white, or barred.

The tourneys of the ruff are classical examples of communal courtship display; but many other species over the world have similar community dances, notably the black-cock of northern Europe, the prairie chicken and the sage grouse of North America, the mannikin and the cock-of-the-rock of the American tropics, and some birds of paradise in New Guinea. Probably the display of the ruff is so widely known because its dances are held in open grass country where the birds can be watched. The species is common in Holland and thus its performances have long been accessible to students of birds.

The scene in the exhibit is in Holland, where the flat green fields, waterways, grazing cattle, and windmills shown in its panoramic background are common features of the landscape.

In the spring the males gather in some place that has been used for generations as a dancing ground. Each ruff has its own little bit of ground where its continual running about wears off the grass, so that the grassy meadow is dotted with regularly placed,

bare courts a foot or two in diameter. In action the birds present a lively scene, dashing about excitedly, pausing to assume strange rigid poses, dancing about, and pecking at each other. It all seems confusion, but it is rather a succession of stylized displays. In the *Handbook of British Birds* students have characterized three main types of display: (1) "An excited scuttling about with head and neck horizontal or bill inclined slightly upwards with ruff expanded and wings more or less spread or fluttering." (2) "Bird suddenly halts and crouches with bill touching the ground, ruff expanded, wings half open, tail spread and bent down." (3) "A spasmodic shivering of feathers and quivering of wings."

The hostility between males is over the little piece of ground that each has pre-empted for his own dancing. It is his territory. By display, bluff, threat, and even fighting he keeps the other males off, but the displaying usually takes the place of fighting, and rarely are serious injuries inflicted.

Finally the female comes to the area to make her choice. There is no fighting then. "The ruffs jounce about in excitement and then go into the rigid stance; she walks up to the bird of her choice." Perhaps color, or condition, or stance has attracted her fancy to one among the many vari-colored contestants. Mating takes place without interruption. Apparently the females are promiscuous, for while the males usually remain on their own little territory on their own display ground, females have been recorded as visiting more than one display ground.

After mating, the male and the female separate. The female, with no help from the male, builds her nest of grass in a hollow in an open meadow, marsh, or tundra, incubates her four gray to greenish, thickly marked eggs, and cares for the downy chicks, which are able to follow her soon after they are hatched.



Exhibit in Chicago Natural History Museum

Eagle Owl

The open coniferous snow-covered forest with a horned owl perched on a stump and pestered by jays presents a scene in Manchuria. At a casual glance it might be taken for a scene in the Rocky Mountains, for the appearance of the country is similar. The European species shown—the eagle owl—is slightly larger but very similar to our great horned owl. The Old World jays are rather different in appearance but are related to

our jays. This helps to illustrate the great uniformity of life in the broad belt of coniferous forest that encircles the northern part of the globe. This similarity is shown in many species of birds: Richardson's owl, the American three-toed woodpecker, the raven, the Canada jay, the kinglets, the black-capped chickadee, and the crossbills of our coniferous forests—each finds a closely related counterpart in Eurasia.

The "mobbing" of an owl depicted here is one example of a very widespread phenomenon, the gathering of a number of species of potential prey to scold and pester a potential predator. It may be a group of small songbirds about an owl, a hawk, a snake, or a fox. It sometimes seems to be an expression of curiosity about an animal seldom seen, in which the curious birds, becoming excited, call loudly and attract others. Crows and jays often take a leading part in such assaults on owls. Apparently they do it purely for amusement, and they seem to enjoy the excitement they stir up. Sometimes, especially with snakes, it almost seems as though a peculiar, instinctive type of behavior has evolved as a response when a snake is seen under certain conditions. This type of behavior does not seem to correlate well with the distinctly aggressive actions of, say, a kingbird driving a hawk or a crow out of its territory, or the frenzied chasing of a cat by a nesting pair of robins, in which a direct aim is in sight and is often achieved.

The usefulness of the mobbing behavior to an individual bird is doubtful. It would seem safer for the bird to keep its distance. But from the viewpoint of the species or the population it is perhaps beneficial. The predator's location is advertised. It cannot move without its attendant chattering annoyers, so that it cannot surprise its intended prey. Hunting becomes impossible in that area, and from this point of view the birds may be thought to band together for their common benefit.

THE ETHIOPIAN REGION

Seven families of birds are found only in Africa: the whale-headed stork; the secretary bird; the plantain-eaters; the mouse birds; the rock fowl; the oxpeckers; and the helmet shrikes. Ostriches are almost restricted to Africa; the hammerhead stork and the guinea fowl occur outside Africa only in Madagascar. In addition, there are groups of species such as ground hornbills, wood hoopoes, bush shrikes, and certain groups of weaver birds that are also characteristic of Africa.

Madagascar and its nearby islands have a small fauna, compared with the rich and varied bird life of Africa, but many of the elements of this zoological subregion are very distinct, indicating long separation from Africa. The giant pigeon family (Raphidae), best known from the dodo, has become extinct within recent times, and the elephant birds (Aepyornithidae) disappeared before historical times, only their bones and their eggs being known. Four families have members still living: the mesetes (Mesoenatidae), the ground rollers (Leptosomatidae), the asitys (Philepittidae), and the Madagascar shrikes (Vangidae). To some students, Madagascar appears sufficiently distinct to be regarded as a separate region.

South of the Sahara Desert, the Ethiopian Region presents much diversity. The distribution of birds seems to be most closely correlated with vegetation, which is based in turn on climate.

There are two main divisions:

I. West African Subregion

- A. Guinea Forest Province; the rain forests.
- B. Guinea Savanna Province; the savanna fringing the forest.

II. East and South African Subregion

- A. Humid Montane Province; the forests on the scattered mountains above 5,000 feet (Mount Kenya, Kilimanjaro, Kivu, Ruwenzori, Cameroon, etc.).
- B. Sudanese Province; the bush country just south of the Sahara.
- C. North East Africa Province; the Abyssinian highlands and arid Somaliland coast, and South Arabia.
- D. Eastern and Southern Province; East and South Africa.



Exhibit in Chicago Natural History Museum

Mount Cameroon; Birds of an African Mountain Forest

The Mount Cameroon group represents the rain forest in Africa. Through the break in the trees can be seen the top of the lowland rain forest, which extends unbroken for a thousand miles south and east to the far edge of the Belgian Congo, and with slight interruptions to the northwest as a coastal strip to Sierra Leone in Upper Guinea. In the background is Mount Cameroon, rising to just over 13,000 feet. Its upper third is treeless but the middle third is covered with the mountain rain forest shown in the group. In the foreground and on the right are liana-draped tree trunks with a luxuriance of epiphytes. This forest, where as much as 500 inches of rain may fall in a year, is characterized by a luxuriant tangle of dracaena, lianas, ferns, amaryllis, orchids, and wild figs.

The most conspicuous birds are the red-tipped plantain-eaters, or touracos, which represent a peculiar African family distantly related to the cuckoos. Six of these gorgeous birds are gathered about the fruits on the branch of a wild fig. One of them, in the immediate foreground, is shown in flight, displaying its gorgeous carmine wing feathers. The characteristic red that generally is to be found in the wings of touracos results from the presence of an organic pigment, turacin, that contains 7 per cent copper. It can be dissolved in slightly alkaline water; when a slight amount of ammonia is added to water in which these feathers are washed, the red disappears. This curious kind of coloration is found only in this family of birds and has given rise to many incorrect statements about the touracos. The rain, and bathing, doesn't wash out the red color of the birds; if the color is lost, it cannot be regained.

Besides the plantain-eaters, a green forest fruit pigeon, and a flycatcher—all characteristic forms of the lowland rain forest—the group shows six mountain forest birds: a thrush, a sunbird, a babbler, an oriole-finch, a woodpecker, and a shrike. But you must look closely to see them. In rain forests, birds may be hard to see.

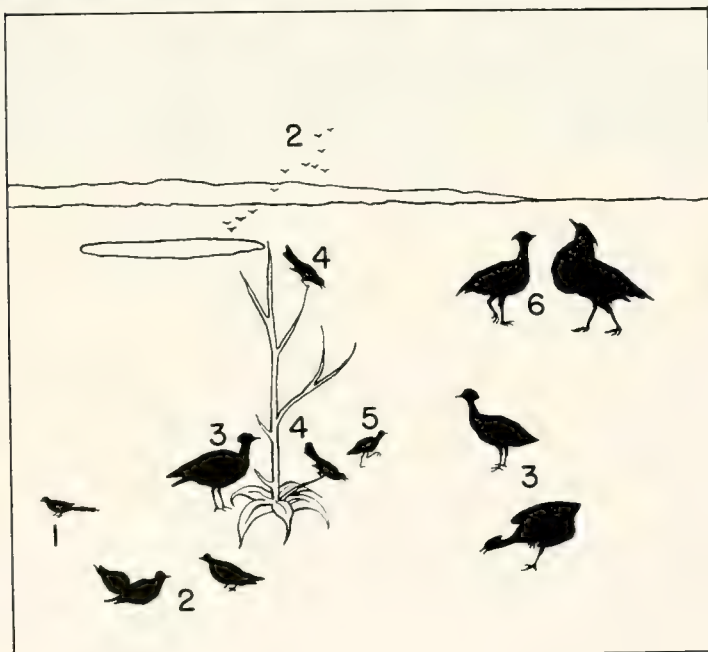
From the point of view of the study of distribution Mount Cameroon is particularly interesting. The mountain rises in the corner of the Gulf of Guinea in West Africa, quite isolated, though in line with mountains on the nearby islands of Fernando Po and other highlands in the Cameroons. These mountains and highlands are inhabited by a whole series of birds that are quite different from those of the lowland rain forest and are most closely related to those of the mountains in East Africa more than a thousand miles away. Thus these mountains are classified as part of the East and South African Subregion, the Humid Montane Province, despite the fact that they lie in West Africa. Long ago they were probably connected with the East African mountains, but the connection has since disappeared.



Exhibit in Chicago Natural History Museum

KALAHARI DESERT; BIRDS OF THE DRY COUNTRY

CHART ILLUSTRATING EXHIBIT OF BIRDS OF KALAHARI DESERT



1. Namaqua dove (*Oena capensis*)
2. Yellow-throated sand-grouse (*Eremialector gutturalis*)
3. Kalahari black bustard (*Afrotis afra*)
4. Scarlet-breasted shrike (*Laniarius atrococcineus*)
5. Two-banded courser (*Rhinoptilus africanus*)
6. Giant bustard (*Choriotis kori*)

Kalahari Desert; Birds of the Dry Country

The Kalahari Desert, in southern Africa, represents the extreme of desert conditions. The scant vegetation, the bright but pale landscape, and the matching color of many of the birds are characteristic of arid regions.

Water, where it is present, is the center of attraction in arid country. The site of the Kalahari group is the Gomodino Pan. A "pan" in South African terminology is a slight depression in the center of a plain. The depression fills with water in the rainy season. The water evaporates in the dry season and may entirely disappear. These "water holes," as they might be called elsewhere, are often brackish or even saline, but over large areas in the Kalahari they are the only available water, and around them bird life congregates.

The yellow-throated sand-grouse, three of which are resting in the shade of a shrub in the foreground, makes spectacular flights to water, sometimes at considerable intervals. A big flock in such a flight is shown in the background. The birds alight and drink quickly and are then away into the desert, where they spend most of their lives. They look like partridges but are most closely related to pigeons.

In the center of the exhibit a pair of black-bellied bustards displays interest in a small sand lizard, which has attracted the attention also of a pair of scarlet-breasted bush shrikes. A two-banded courser is scooting away from the commotion.

In the background to the right, stands a pair of giant bustards. This bird attains a length of about 57 inches and a weight of 42 pounds. It runs with great speed, using its wings to aid in balancing, like an ostrich, but it also flies, with a heavy but rapid flight. The bird on the right is a male, inflating its throat in a courtship display aimed at the female facing it.

Another characteristic bird of the open country of Africa, the flightless ostrich, appears in the background. Ostriches eat plant material, and they are delicate feeders, plucking a leaf here and another there; and though they drink when water is available, they can go for long periods without water.

The bateleur eagle shown in the background is considered one of the most striking of African birds, because of its size, its color, and its flight. Its soaring has been compared with that of an albatross, and its many fascinating antics in the air include turning somersaults in flight, whence presumably its name of bateleur ("harlequin" or "mountebank").

Village Weaver Bird in the Savanna Country

The remarkable nesting habits of the weaver birds are the main theme of a West African exhibit, whose setting is the French Sudan. The terrain in the foreground shows the savanna country, where the trees are more widely spaced than in the rain forests, where more light gets through to the ground, and where grass is characteristic. Savanna rather than rain forest develops where there is a rainfall of less than 60 inches per annum. The scene shown is on the Niger River, near the village of Niamey in French West Africa.

The weaver birds as a group have conical bills adapted for seed-eating, and in Africa they take the place of the seed-eating sparrows in America. They are so common as to individuals and so abundant as to species that they well merit a special exhibit. In addition they have a number of extremely interesting habits. The species shown in the group, the V-marked or village weaver bird, delights to nest in villages of its own. The nests shown in the exhibit are built on the branches of thinly leaved trees overhanging the huts of the native people. This weaver bird is colonial, and its "villages" may consist of hundreds of nests.

The name, "weaver bird," comes from the habit of weaving the nest material. The species shown, one of the most skillful builders of the family, weaves its globe-shaped nests from strips of grass or palm leaves. Various stages in the construction are shown. First, a vertical ring about six inches in diameter is woven, to serve as the foundation. Next, the hemispherical chamber, which serves as the nest proper, is added to the ring on one side, and the down-turned spout or tunnel-like entrance is added on the other.

Some weaver birds make only crude, untidy domed nests placed among twigs, while others make more elaborate structures with long hanging spouts that may be two feet long; one very notable species is the sociable weaver of southwest Africa, which makes its nests in a close-packed colony under one roof.

One species of weaver has been shown not only to tuck in the loose ends of nesting material, but actually to make certain definite knots to tie it in place.

One might think that such weavers would be relatively immune from predation at the nest, with the nest dangling from the tip of a branch, but the African harrier hawk has developed the habit of robbing weaver-bird nests. This big, slow-flying, gray and white and black bird seizes a weaver's nest in its claws and hangs back downward, flapping its wings, as it reaches in and drags forth the young weaver bird.



VILLAGE WEAVER BIRD IN THE SAVANNA COUNTRY

Exhibit in Chicago Natural History Museum



Exhibit in Chicago Natural History Museum

Birds of a Nile Papyrus Marsh

The scene of this group is Lake Kyoga on the upper Victoria Nile, just below where it flows out of Lake Victoria in Uganda, eastern Africa. Ahead, the water dappled with lily-pads stretches to the horizon. To the right, lines of papyrus break the view and frame the vista. To the left, marsh-grass areas dotted with a few trees or bushes appear, flanking low, distant, blue hills.

The central figures are the whale-headed stork and the crowned crane. The whale-head, related to the stork, is the sole species in the family Balaenicipitidae with a distribution restricted to the swamps of central Africa. It is a somberly colored grayish bird with a huge bill and a curious pert crest. Its home is in the big marshes. Because it is usually a solitary bird, we have placed a single individual near the right front of the case.

The other African bird chosen to share the focal point in the case is the crowned crane. Contrasted with the whale-head it is a graceful, active, beautiful, and well-known bird. The straw-colored crest recalls in a curious way the fruiting head of a papyrus—the wattles are crimson, the bare cheeks white and crimson, and the plumage gray, ornamented with big patches of white and maroon in the wings. The bird is gregarious—flocks of several hundreds have been recorded, and as many as a thousand birds have been seen in a twenty-minute flight past a camp. They frequent grain fields,

where, in addition to eating insects, they dig up grain, and they have a habit, common to many cranes, of dancing. A black open-bill stork is just beyond the cranes. Close at hand swim a pair of pigmy geese and a crested grebe with a downy young one riding on its back. Beyond, a painted snipe displays its ocellated wing in flight; nearer are a long-toed plover with one of its downy young, a coot, and a gallinule; beyond, an anhinga swims toward three tree-ducks perched on a lump of mud.

In the background are herons, egrets, and ducks. More crowned cranes are on a far mud bank, and a fishing eagle circles overhead. Looking closer, one sees lesser fowl; a black rail peers from the papyrus; a malachite kingfisher rests on a lily-pad; weaver-birds are nesting in the papyrus, where a little swamp flycatcher flits.



CHART ILLUSTRATING EXHIBIT OF BIRDS OF NILE PAPYRUS MARSH

- | | |
|---|---|
| 1. Whale-headed stork (<i>Balaeniceps rex</i>) | 12. White-faced tree duck (<i>Dendrocygna viduata</i>) |
| 2. Crowned crane (<i>Balearica regulorum</i>) | 13. Fish eagle (<i>Cuncuma vocifer</i>) |
| 3. Great crested grebe (<i>Podiceps cristatus</i>) | 14. Black crane (<i>Limnecorax flavirostra</i>) |
| 4. Dwarf goose (<i>Nettapus auritus</i>) | 15. King reed-hen (<i>Porphyrio madagascariensis</i>) |
| 5. Buff-backed heron (<i>Bubulcus ibis</i>) | 16. African darter (<i>Anhinga rufa</i>) |
| 6. White-backed duck (<i>Thalassornis leuconotus</i>) | 17. Malachite kingfisher (<i>Corythornis cristata</i>) |
| 7. Painted snipe (<i>Rostratula benghalensis</i>) | 18. Swamp flycatcher (<i>Alseonax aquaticus</i>) |
| 8. Long-toed plover (<i>Hemiparra crassirostris</i>) | 19. Sand plover (<i>Charadrius pecuarius</i>) |
| 9. African jacana (<i>Actophilornis africana</i>) | 20. Yellow-mantled whydah (<i>Coliuspasser macrourus</i>) |
| 10. Red-knobbed coot (<i>Fulica cristata</i>) | 21. Orange bishop (<i>Euplectes franciscana</i>) |
| 11. Open-billed stork (<i>Anastomus lamelligerus</i>) | 22. Yellow-collared weaver (<i>Ploceus capitis</i>) |

THE ORIENTAL REGION

The Malay countries have tropical rain forests, swamps, and wooded mountains; in India there are also extensive plains and deserts. To the north the region is bounded by high mountains, the Tibetan highlands and the Himalayas, where coniferous forests and the higher treeless zone extending to the snow fields form an outlying subregion of the Holarctic.

The bird life of tropical southern Asia, and of the islands as far as Java and Bali, is surprisingly like that of Africa. Though there are many endemic genera and species, there is not a single family of birds peculiar to the Oriental Region. To consider it as a separate region is partly a matter of convenience, and partly a recognition of the abundance of certain groups of babbling thrushes, bulbuls, drongos, sunbirds, and specialized gallinaceous birds, which have their headquarters there. For many years it was thought that the broadbill family was Oriental only, but representatives have now been found in Africa. The degrees of resemblance and difference between the Ethiopian and the Oriental and the African Regions are well shown in the large mammals, many of which are similar, like the elephant, rhinoceroses, and buffaloes, but for the most part represent distinct genera.

Though the jungles, swamps, and plains of India and the Malay countries are rich in bird life, its close relationship with African bird life indicates that the desert, which now forms a partial barrier between the Oriental and the African Regions, is recent. In the not very distant past, as geologists count time, the forest faunas of India and Africa were probably joined by a continuous band of forest.

Green Peafowl

The green peafowl, a species quite distinct from the more familiar common peafowl, is one of the largest and finest of all birds. The male, with its fine train, may measure seven feet in length, and the female, without a train, about four feet. In color and pattern, with a metallic green ground color ocellated and marked with blue and coppery yellow, and with a long ocellated train, it is a gorgeous creature. As with its cousin, the blue peacock, often domesticated, the train of ornamental feathers borne by the male is not the tail. It is formed by specially elongated upper tail coverts, which can be erected and spread into a great fan, supported by the short stiff tail feathers and used in courtship displays to the female.

The green peafowl, rarely seen in captivity, lives in and near the jungles of Indo-China, Malaya, Burma, and Java. The exhibit shows the peacock and his mate perched on a dead branch above the tropical forests of Annam, in Indo-China. Peafowl spend the night roosting in tall trees, and morning and evening their loud calls ring through the forest. The call has been variously described; one version refers to it as a loud discordant squall audible at a great distance and sounding like the cry of a tomcat in distress. The birds feed on the ground, sometimes walking out into the fields, and parties of birds often mix with the herds of domestic buffalo. Where much hunted the peacock becomes very shy and runs rapidly to a great distance, readily outdistancing a man on foot.

Little seems to be known of its breeding habits, but the species is polygamous, parties of a cock and four or five hens being common. The nest, unlike that of the blue Indian peafowl, is usually placed under a bush in a clearing where the three to five tawny eggs are laid.

The specimens for the group were collected by the late Wilfred H. Osgood, Chief Curator of Zoology, 1921-40, during an expedition financed by himself.

THE
GREEN
PEAFOWL

Exhibit in Chicago Natural History Museum



THE AUSTRALIAN REGION

In the present treatment, New Zealand, Australia, New Guinea, and the Polynesian Islands, though in many respects extremely diverse, are regarded as forming the "Australian Region."

Australia has deserts and savannas, and, in the northeast, rain forest; New Guinea has savannas and rain forest resembling those of northeast Australia. New Guinea is near the equator but the mountains rise to about 15,000 feet and zonal bands of different species of birds are very evident on them. The lowlands are mostly rain forest, but at higher altitudes belts of oak, beech, and coniferous forest occur, with alpine grassland above them.

In the New Guinea-Australian area several well-marked families are characteristic, notably those of the cassowaries, emus, lyre birds, birds of paradise, bower birds, and honeyeaters; also, several groups of passerine birds are so different from any others that they should probably be considered to be small endemic families. Among these are the Australian nuthatches, the bell magpies, the magpie-larks, the scrub birds, the diamond birds and the gray jumper. Certain groups of birds are also especially characteristic of the New Guinea-Australian area, with many species: parrots and lorries, pigeons and doves, kingfishers, crested swifts, frogmouths, and certain Old World groups such as thickheads and fairy wrens. Megapodes, fowl-like birds with the curious habit of burying their eggs in the earth or in piles of dead vegetation and leaving them to hatch by themselves, are also most plentiful in this area.

One of the striking New Caledonia birds is the kagu, with but one species, for which a separate suborder has been erected.

In the Pacific Islands, which evidently received their birds from overseas, the fauna is poor. The number of resident birds depends on the size of the islands and the distance from large land masses. This is well illustrated by the following numbers of native land birds: Australia, 488; New Guinea, 509; Solomon Islands, 127; Fiji Islands, 54; Samoa, 33; Society Islands, 14; Marquesas Islands, 11; Henderson Islands, 4; Easter Island, 0.

As one goes out toward the outer rim of the scattered South Sea islands, one finally comes to localities like Easter Island, so small and remote that no land bird has been able to colonize it.

New Zealand has a grand total of about 300 recorded birds, but more than two dozen are known only from fossils, 31 are well-established introduced species, and more than 100 are sea birds, so that the living, native, land and fresh-water birds probably number about 100 species.

The New Zealand avifauna is noted for its moas, which were giant birds, larger than ostriches, that were apparently exterminated by the early Maoris. The related and

equally flightless kiwi, the subject of a Museum group, is hardly less extraordinary, and many of the other land birds are very different from their nearest relatives. There is the kea, a parrot, some individuals of which have acquired the habit of pecking open the backs of living sheep and feeding on their flesh; a flightless parrot that nests in holes in the ground; and crow-like, thrush-like, and warbler-like birds, for each of which separate families, restricted to New Zealand, have been suggested. This modern bird fauna is noteworthy and becomes even more remarkable when the remains of the moas, various extinct rails, and a goose, swan, and eagle, also known only as fossils, are included. But this isolated fauna has suffered badly from the impact of white civilization. The destruction of the original forest, the introduction of deer, the rats and weasels, which are active predators, and a host of introduced birds, which acted as competitors, probably all helped to bring about the extinction of many species and the great scarcity of others. In Auckland at the present time the conspicuous birds are not native species but rather the European skylark and blackbird and the English sparrow.

North Island Kiwi

The kiwi has no near relative. It is a survivor of an ancient branch as old as that of the emu-cassowary-ostrich-rhea group (*Struthioniformes*, etc.), in which it finds its nearest, though still distant, relatives. Flightless, with very small wings, a plumage of long filamentous feathers, and a long, curved bill with nostrils at the tip, the kiwi is most unbirdlike in appearance. The two species live only in New Zealand, where they roam damp forests at night and hide in burrows during the day.

The scene this exhibit depicts is in the forests of North Island, New Zealand, showing the North Island kiwi. In the background the snow-capped volcano of Mount Egmont is seen through tree ferns, epiphytic plants, and mosses that give character to the humid temperate forest at the base of the mountain.

At mating time the kiwi forms pairs that keep together. The female is the larger and more aggressive, which is rather unusual in birds, and, as in the phalaropes, it is the male that takes over nest duties. The nests are made in holes beneath the roots of trees or in steep banks. The size of the egg is very great in comparison with that of the bird, for the kiwi is only about the size of a large domestic fowl, but its egg is ten times as large as a hen's egg and weighs approximately one quarter as much as the bird that lays it. Though the male incubates and mostly cares for the young, the female sleeps in the burrow and helps guard the nest. In this she is more aggressive than her mate. Like its relatives, the ostrich and the cassowaries, the kiwi attacks by kicking forward, and its sharp claws can inflict severe injuries.

The kiwi's eyes are small, despite its being a bird of the night. Unlike most birds in many ways, it is also unlike them in apparently depending much on scent and the sense of touch in locating its food. It seeks its prey of earthworms and grubs by tapping about over the surface of the ground and rotten logs, probing and prying, making audible sniffing noises.

The name "kiwi," like many other New Zealand bird names such as "takahe," "matuku-moona," and "tui," is strange to our ears, coming as it does from the Maori language. But perhaps if we knew the bird better we'd find the name appropriate, for the Maori christened it "kiwi" from its call, which is a short, shrill whistle.



NORTH ISLAND KIWI

Exhibit in Chicago Natural History Museum



THE NEOTROPICAL REGION

The notably distinct Neotropical Region embraces all of South and Central America, the West Indies, and the southern part of Mexico as far north as the limit of the tropical forest. The diversity of its bird fauna is unequaled by that of any other zoogeographical region, and no other exhibits so marked a degree of endemism. Only the Australian Region is older in point of continuous isolation and, as might be expected, the endemic fauna of each includes a preponderance of generalized, or "more primitive" types of birds whose ancestral forms evolved long before the less ancient Regions became completely isolated.

Two orders of birds, the Rheiformes (rheas) and Tinamiformes (tinamous), as well as some twenty-seven families, are entirely restricted to the Neotropical Region. Several additional families, notably hummingbirds, cotingas, flycatchers, troupials and tanagers, are essentially Neotropical in origin and distribution, although representatives of each now occur in North America as well. It is not to be supposed, of course, that each of these endemic groups is represented throughout the Region. On the contrary, the present-day distribution of birds at family level varies considerably, just as does the distribution of genera and species within a single family.

Many endemic Neotropical families are notably widespread, but some, like the palm-chats and todies of the West Indies, the oil-birds of Trinidad and northern South America, and the seed-snipe and cariamas, to mention a few, occupy relatively limited ranges. Others, like the sharp-bills (*Oxyruncidae*), have a discontinuous range, an explanation of which must be sought in the past. The diverse patterns of distribution found within a single zoogeographical region stem largely from the variables of isolation within the region. Isolation of one kind or another is a prerequisite of differentiation among birds. There may be isolation in time as well as in space, or a combination of the two. Thus the time and place of origin, even more than present ecological conditions, determine the distributional pattern of many birds.

The Neotropical Region is notably diverse in habitat conditions. It extends over many degrees of latitude, embracing both lowlands and mountain ranges, and deserts as well as humid jungles. Within it may be recognized several Subregions, each more or less clearly defined and characterized by endemic species, genera, or even families of birds. The most distinctive Subregion is the Antillean, which includes most of the islands of the West Indies. Many birds of Nearctic origin are found in this Subregion, but its fauna is nevertheless much more closely related to that of Central and South America, as shown by the preponderance of families common to both. Two families of birds, the palm-chats and the todies, as well as numerous genera and species, occur only in the West Indies. Other less clearly defined Subregions are the Central American, Amazonian, Brazilian, and Patagonian.

Guatemala Forest; Birds of the Tropical Central American Lowlands

A small segment from the upper tree-level of a great tropical forest is reproduced in this exhibit. The locale is in the lowlands of eastern Guatemala, near Puerto Barrios, an area supporting a rain forest characteristic of humid lowlands from southern Mexico southward to the grasslands of South America. A fruit-bearing tree serves as the focal point for the gathering of several species with similar food habits. Other birds commonly found among the upper branches of great forest trees are also present.

Two kinds of toucans, the short-keeled and the collared aracari, are shown in competition for the mutual source of food. A bishop grosbeak, also a fruit-eater, is in the center foreground.

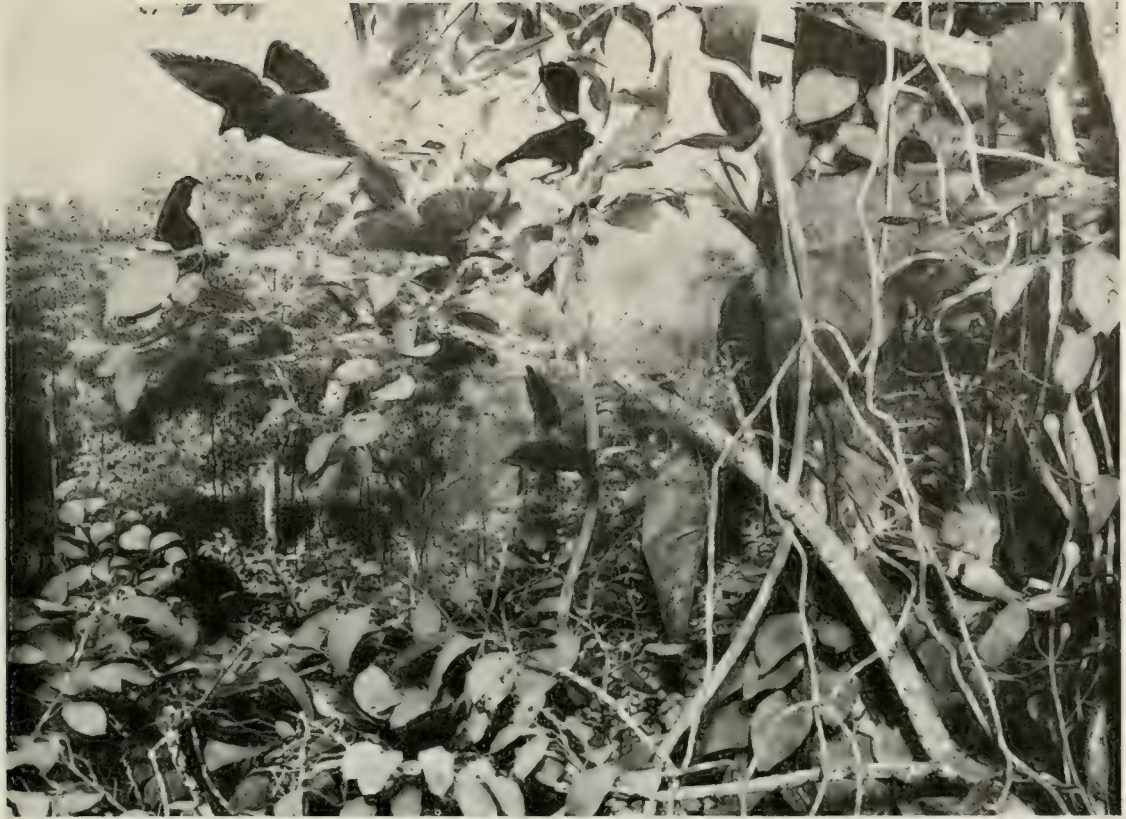
Toucans are among the most prominent and characteristic birds of the American tropics. Some toucans bear a striking resemblance to some of the smaller hornbills of the Old World. They are, however, more closely related to the woodpeckers than to the hornbills, and occur only in the warmer parts of the western hemisphere. Perhaps the most prominent physical characteristic of the toucan is its enormous bill. In many forms the bill is highly colored and has the appearance of great weight. It is, on the contrary, extremely light, the outer portions being very thin and filled with cellular bony tissue. The tongue of a toucan is also a remarkable structure, consisting of a flat, narrow plate with a series of notches along the margins.

All toucans are forest birds and, within their range, one species or another is usually found in abundance from sea level upward to an altitude of 7,000–8,000 feet in the mountains. They are primarily frugivorous and, except when breeding, generally associate in noisy flocks that roam the forests in search of food. Berry- and fruit-bearing trees invariably attract large numbers. It is not unusual to find the upper branches alive with these grotesque birds. Toucans become more furtive during the breeding season and the large flocks disband. From one to three eggs, usually white and somewhat glossy, are deposited in hollow trees.

Scarcely less characteristic of tropical America are woodhewers, one species of which can be seen ascending the bole of a tree in the left foreground. Like toucans, these birds are endemic to the western hemisphere and have their center of abundance in the Amazon basin. All woodhewers are relatively drab in color, and primarily arboreal. The specialized feeding habits of some species have led to remarkable modifications of the bill, which may vary from a short, sturdy structure to a slender sickle-like organ. The tail, too, has become modified to serve as a support while feeding, as with the woodpeckers, although otherwise the families are fundamentally distinct.

EXPLANATION OF CHART (p. 79) ILLUSTRATING EXHIBIT OF BIRDS OF GUATEMALA FOREST

- | | |
|---|--|
| 1. Short-keeled toucan (<i>Ramphastos piscivorus</i>) | 4. Western barred woodhewer |
| 2. Collared aracari (<i>Pteroglossus torquatus</i>) | (<i>Dendrocolaptes certhia</i>) |
| 3. Chestnut-collared woodpecker | 5. Wood thrush (<i>Hylocichla mustelina</i>) |
| (<i>Celeus castaneus</i>) | 6. Bishop grosbeak (<i>Caryothraustes poliogaster</i>) |



GUATEMALA FOREST

Exhibit in Chicago Natural History Museum





Exhibit in Chicago Natural History Museum

Common Rhea

In the interior of South America, east of the Andes and south of the Amazonian forest, there is a vast grassland that extends over thousands of square miles. In Brazil such country is known as “campo,” in the Argentine as “pampas.” The area is characterized by seemingly limitless plains that may be either perfectly level or gently undulating. Sparse forests of a modified or intermediate type occur here and there, particularly along the watercourses. Elsewhere there is little vegetation except grass, shrubs, and occasional stunted trees.

The pampas are perhaps best known to the public for their gauchos, or native cowboys. These swarthy horsemen are a picturesque and hardy lot. Even today they ride a

range and live under conditions that are not unlike those of our own western plains a century ago. Much of the pampas is now given over to cattle-raising, for which the unfenced prairies are ideally suited. Their production of beef has become an important factor in world economy.

As might be expected in so distinct an area, the pampas support a generous fauna very different from that of the adjacent forests and mountains. Bird life is varied and abundant, but several families and many genera and species are endemic to these grasslands. Perhaps the most characteristic of all is the rhea, the so-called South American ostrich. True ostriches have never existed in the western hemisphere, but the somewhat smaller rhea is similar in habits and appearance. Like ostriches, rheas can not fly, and live in open country where keen vision and speed afoot are adequate protection. Adult birds, when frightened, have been clocked at more than forty miles per hour and few horses can outrun them in a flat race. Rheas are the largest of all American birds and may weigh up to 85 pounds. They are especially abundant on the campo of Matto Grosso, in southwestern Brazil, the locale of the Museum's exhibit being Capao Bonito.

The breeding habits of this species are rather unusual. Rheas normally associate in mixed flocks that may number several dozen birds. At the beginning of the nesting season, in October or November—springtime south of the equator—each mature male gathers together a few females. A nest of grass, twigs, and feathers is prepared and used by each small flock. As many as 65 eggs may be deposited in a single nest by the several females, although 25 or fewer are more usual numbers.

Rhea eggs are whitish or buffy in color, and have a volume equal to that of about a dozen hen's eggs. Although somewhat strong in taste, the eggs are often eaten by the natives. Incubation varies from four to six weeks and is accomplished by the male alone, although the females remain in the general vicinity of the nest during the period of incubation. Later they are joined by the male and chicks. It is these family groups, together with the young birds of the previous year, that constitute the large mixed groups to be found between breeding seasons. Rheas are principally herbivorous but probably also eat lizards, snakes, and large insects.

Another endemic bird of the pampas is the cariamá, a specimen of which is pictured in the right background of the rhea exhibit. This long-legged bird stands about three feet tall and is believed to be the closest living relative of *Mesembriornis*, a powerful carnivorous bird that became extinct several million years ago. Cariamás have no close living relatives, but they are usually classified between the rails and the bustards. They are largely terrestrial in habit, although capable of flight, and feed principally on reptiles and insects. Four large eggs are deposited in a bulky nest of sticks and twigs usually placed in the upper branches of a small tree.

Several hundred less noteworthy birds also inhabit the South American pampas. Some, like the burrowing owl in the center background of the exhibit, are represented in similar areas of North America by close relatives. Others, like the tinamou, a partridge-like bird of tropical America, are replaced in forest areas elsewhere by distinct species. Various hawks, flycatchers, finches and many others with a high percentage of endemism occur in such abundance as to constitute a fauna that is characteristic of the South American grasslands.



Exhibit in Chicago Natural History Museum

Montezuma Oropendula

A nesting colony of oropendulas is one of the most arresting sights to be found in tropical America. The huge pendent nests are neatly woven of grasses, tendrils, or strips of bark and may be as much as six feet deep. From a distance they could easily be mistaken for some exotic tropical fruit were it not for the birds that pass back and forth continually while repairing the nests or feeding their young.

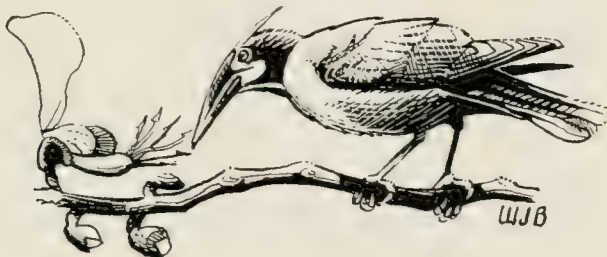
Oropendulas are the largest members of a characteristic New World family represented in the United States by meadow-larks, grackles, cowbirds, bobolinks, and orioles. The twelve species and numerous geographical varieties of oropendulas comprise five genera that are well represented in tropical lowlands from southern Mexico to Paraguay. All construct deep, sack-like nests similar to those in the exhibit. Unlike

most other orioles, however, these birds and certain related tropical forms called “caciques” ordinarily nest in compact colonies that may include a hundred or more breeding birds.

This exhibit is based on field studies made near Escobas, a United Fruit Company plantation in the humid lowlands of eastern Guatemala. It reproduces a small segment of a breeding colony of Montezuma oropendulas, a common Central American form and one of the largest members of its family. This colony consisted of 138 nests in various stages of completion and use. All of the nests were suspended in a small area at the very top of a towering tree that measured almost seven feet in diameter at the base and was well over 100 feet high. Another similar nesting colony may be seen in the right background of the picture.

These colonies are the scene of great activity during the breeding season. The nests are built by the females, which usually outnumber the males and can be distinguished by their much smaller size. Dr. Frank Chapman’s remarks about the nest-building of a related oropendula would serve equally well for the present species. “Building birds often take material from another bird’s nest either in their own or an adjoining group. Some birds, indeed, are chronic robbers and steal a large part of their material. Slovenly builders are more apt to be robbed than those that have no loose tempting ends about their structure. A poor builder is often, therefore, heavily handicapped, for a day’s work may be undone in a short time by her thieving neighbors.”

Besides the filching of building material by their neighbors, nesting oropendulas are constantly harried by other birds. One, a large parasitic grackle, seeks any opportunity to enter an unguarded nest for a moment in order to deposit its eggs among those of the oropendula. Hardly less annoying is the striped flycatcher, which, through sheer persistence and aggressiveness, sometimes succeeds in taking over an entire nest for its own use. Certain hawks and owls also prey upon oropendula colonies, but the alert males, with little else to do, act as sentinels during the breeding season.



Quetzal

The quetzal, national bird of Guatemala, is a trogon and is easily the most striking member of this notably colorful family. Many observers consider it the most beautiful of tropical American birds. Certainly few who have seen quetzals in their natural surroundings would deny them a place beside the cock-of-the-rock, the bird of paradise, and the regal peacock as jewels of the bird world.

The mountain forests of Central America are the habitat of this exotic species. Only there, in the moist rain forest of the cloud belt, 3,000–6,000 feet above sea level, can the quetzal be found. It is a region of great beauty and charm. Bromeliads and other epiphytes of infinite variety festoon the branches of trees whose trunks are clothed with moss. Tree ferns are a prominent feature of the rich mountain vegetation. Their fronds wave gently with each vagrant breeze and, when seen dimly through the mists, create an illusion of unreality that is peculiarly appropriate as a background for so striking a bird.

Quetzals derive their name from Quetzalcoatl, the legendary king and founder of the Aztec culture of Mexico—a civilization that was in full flower at the time of the white man's arrival. Only priests and nobles of native tribes were permitted to wear the long plumes as a personal adornment, since quetzals were venerated as religious symbols. The birds were never killed by the Aztecs, their plumes being plucked from caged specimens otherwise treated with reverence. Later the species was decimated over much of its range as thousands of males fell prey to professional plume-hunters who sought to satisfy the requirements of the millinery trade. This slaughter was stopped by international agreement some years ago and today quetzals occur fairly abundantly in favored localities from southern Mexico to Panama.

The trogon family is a group of tropical forest dwellers of wide distribution in both the Old World and the New. The male quetzals differ from all other trogons in having the rump adorned with several filmy plumes that extend as much as two and sometimes three feet beyond the end of the tail. A prominent crest, compressed laterally, further distinguishes the male, whereas female quetzals are less brightly colored and are lacking in special adornments. Like many other trogons, quetzals feed on the pulp of certain forest fruits, which are plucked from the trees while the birds are on the wing. They may make no nest, depositing two bluish-green eggs in an abandoned woodpecker's hole, or they may excavate a cavity for themselves in rotten wood. Young quetzals are black and naked when hatched and are attended by both parents.

The specimens in the group were collected on the slopes of the Volcan Tajumulco, by special permission of the Guatemalan Government. The background scene is a composite from the volcano-studded Guatemalan escarpment.



Exhibit in Chicago Natural History Museum

QUETZAL

Ibis and Screamers

Mangrove swamps, such as the one shown in this exhibit, are characteristic of most tropical coastlands that are inundated periodically by tidal action. They often extend over great areas and are remarkable both for the impenetrable nature of their vegetation and for the sparse bird fauna they shelter. A few species, nevertheless, do find suitable conditions in mangrove swamps, among them being various birds of remarkable color and form.

This scene at the edge of a mangrove swamp in northern Venezuela contains several unusual tropical American birds that are commonly associated with this type of habitat. The scarlet ibis is perhaps the most vividly colored bird known to science, the red of its plumage being one of the most highly developed colors found in nature. This ibis ranges over northern and eastern South America, where it is locally abundant in tidal flats covered with mangrove forests. Wanderers are sometimes reported in the West Indies.

Words are inadequate for describing the scarlet ibis in its natural surroundings. Various authors have likened it to "a jet of flame," "a beautiful red stain on the green background," a "rose-colored cloud lighted by the morning sun," or as having a "scarlet livery of dazzling beauty," etc. It is certain that the sight of these brilliantly colored birds winging their way across a tropical background is an experience not soon forgotten.

Like most ibises, this species breeds in large colonies, which disband and forage in small flocks at other seasons. Individuals range widely while feeding, but usually return to definite roosting places each night. Their food consists principally of small fishes, crustaceans, and even insects that are found on beaches and exposed mud flats. Flocks of scarlet ibis often associate with herons, spoonbills, and various shore birds while feeding, but even the most colorful of these appear drab by comparison.

Two species of screamers, which belong to a small family of goose-like birds endemic to South America, are shown mingling with the scarlet ibises. At the left are three examples of horned screamer, both sexes of which are distinguished by a slender bone-like appendage attached to the forehead. The somewhat smaller northern screamer is represented by a male in the foreground and by a female perched on a mangrove at the right. Both species inhabit mangrove swamps and the edges of lagoons in northern South America. A third species occupies an extensive range south of the Amazon.

Screamers derive their name from their remarkable vocal abilities. Regarding the southern species, Hudson has written: "When disturbed, or when the nest is approached, both birds utter at intervals a loud alarm-cry, resembling in sound the anger-cry of the Peacock, but twice as loud. At other times its voice is exercised in a kind of singing performance, in which the male and female join, and which produces the effect of harmony. The male begins, the female takes up her part, and then with marvelous strength and spirit they pour forth a torrent of strangely contrasted sounds—some bassoon-like in their depth and volume, some like drumbeats, and others long, clear and ringing."



IBIS AND SCREAMERS

Exhibit in Chicago Natural History Museum



CHART ILLUSTRATING
EXHIBIT OF IBIS
AND SCREAMERS

1. Scarlet ibises (*Guara rubra*)
2. Horned screamers (*Anhima cornuta*)
3. Northern screamers (*Chau-na chavaria*)



BRAZILIAN WATER BIRDS

Exhibit in Chicago Natural History Museum



CHART ILLUSTRATING
EXHIBIT OF
BRAZILIAN
WATER BIRDS

1. Cayenne ibis
(*Mesembrinibis cayennensis*)
- 2, 3. Sun-bittern
(*Eurypyga helias*)
4. White-throated ibis
(*Theristicus caudatus*)
- 5, 6. Jabiru
(*Jabiru mycteria*)
7. Sun-grebe
(*Heliornis fulica*)
- 8, 9. Purple gallinule
(*Porphyryla martinica*)
10. Boat-billed heron
(*Cochlearius cochlearius*)

Brazilian Water Birds

Jungle-bordered lagoons and the banks of sluggish tropical streams are the homes of many unusual birds. Several of the more prominent species that are characteristic of these habitats in South America appear in this exhibit. The scene is that of a small lagoon in northeastern Brazil, on the Rio Branco. In such places many species, particularly those with wading habits, are to be found living together in harmony. Similar associations of bird life occur commonly in humid tropical areas the world over, although the component species may differ from place to place.

Jabirus, the most conspicuous birds shown in the exhibit, are the largest American representatives of the stork family. This cosmopolitan group of heron-like birds includes only seventeen species, many of which are widely ranging birds of considerable size. The present species, one of the largest of all storks, occurs locally from southern Mexico southward to Argentina. A smaller species, the wood ibis (not shown in the exhibit), ranges northward to the southern parts of the United States. It is the only true stork found in North America. All members of the family are voiceless, but when disturbed they express alarm or resentment by rattling their heavy bills. Storks take flight reluctantly but are masters of soaring and often ascend to great heights, where they sometimes circle on set wings for hours at a time. Several of the larger storks, among them the jabiru, perform grotesque pre-nuptial dances that evidently serve the same purpose as brilliant colors or special adornments in other birds.

Ibises, of which two species are shown, are closely related to the storks but may be distinguished by their cylindrical and rather slender, decurved bills. They occur in most humid tropical areas, usually in habitats such as this, where small fish, frogs, and other aquatic animals are found in abundance. More than thirty species of ibis are known, of which about a third are found only in the New World.

In the left foreground may be seen a pair of sun-bitterns, the male posturing and displaying his colorful plumage to best advantage, as is customary during the mating season. Sun-bitterns are related to the cranes and rails and their allies. The two species of this family occur only in the lowlands of tropical America. Much less colorful, but also of much interest is the sun-grebe or "finfoot," a specimen of which may be seen perched on a broad leaf at the right. This family is one of great antiquity, with representatives in Africa and Asia, as well as in tropical America. The American form ranges from Argentina northward to southern Mexico, but few birds have so successfully avoided detailed study by ornithologists in the field as has this furtive, semi-aquatic species.

Also characteristic of South American swamps is the gallinule, feeding on the mud-flat near the center foreground, and the boat-billed heron at the right. The latter is so-named because of its peculiar bill, which differs from that of all other herons. Boat-bills are usually placed in a separate family, although in habit and in general appearance they resemble night-herons. The single species has three geographical forms and ranges from Brazil to southern Mexico.



Exhibit in Chicago Natural History Museum

Flamingos

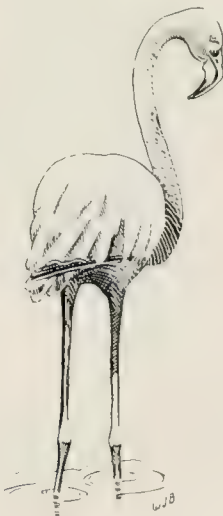
Flamingos are familiar to everyone who has read *Alice in Wonderland*. Far from being creatures of fantasy, however, they form a very distinct family, widely distributed in the tropical and temperate zones of both hemispheres. Although popularly regarded as characteristic of the warmer parts of the world, these grotesque birds also occur in western Siberia and locally in the Andes southward to Tierra del Fuego in South America. Fossil remains from Denmark, from the State of Oregon, and elsewhere further attest to their great antiquity and cosmopolitan distribution.

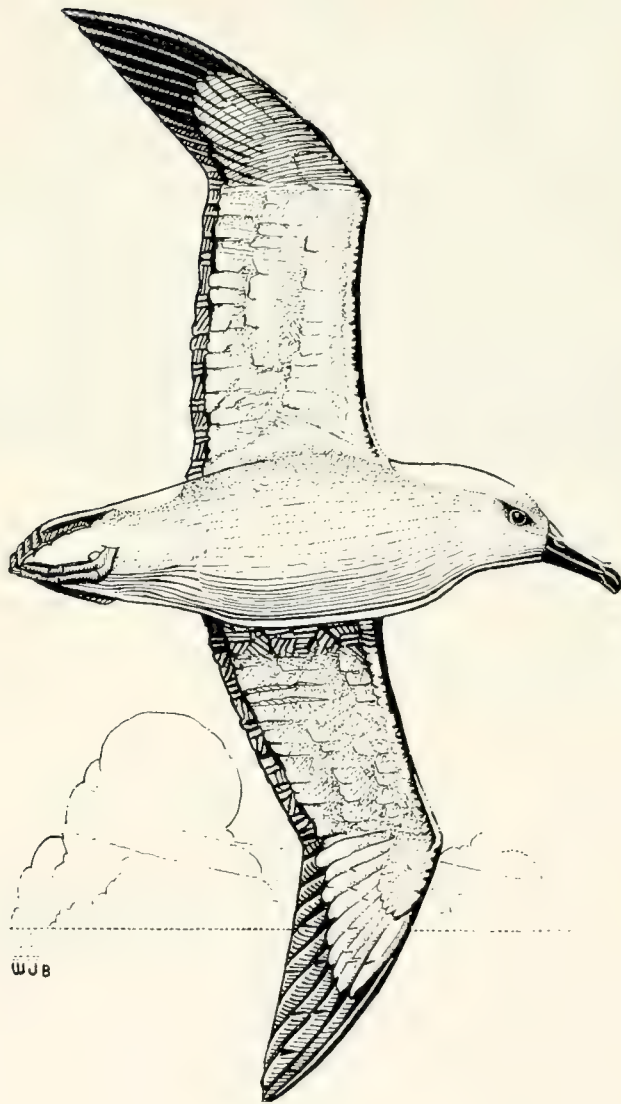
Only three genera and six species of flamingo exist today. All are fundamentally alike in structure, color, and habits. The oddly formed beak attracts immediate attention and is unique among birds. Examination of the lower mandible shows it to be formed like a deep box into which the upper mandible fits like a lid. As with ducks, the edges of the beak are provided with minute grooves, a feeding adaptation that acts as a sieve and permits liquids to drain away while solid particles are retained. The flamingo feeds principally on minute crustaceans, mollusks, and aquatic plants, which it obtains by inverting the beak under the water so that the tip points to the rear while the bird feeds. The reproductive capacity of these minute organisms, required in vast numbers to sustain flocks of such large birds, is one of the marvels of nature.

The American flamingo, shown in the exhibit, is the best known of the four species that are found in the western hemisphere. It occurs in the West Indies, in Yucatan, and along the coast of northern South America. Flamingos formerly bred in abundance on some of the Florida keys, but there have been few authentic records in the United States since 1902. Our group represents a scene in the Bahamas.

Flamingos are gregarious throughout the year and single flocks may include thousands of individuals. With few enemies other than man, these birds are held in check primarily by the limited availability of suitable food and nesting sites. In favored localities, such as the shallow lakes of eastern Africa, hundreds of thousands of birds may be found together in a relatively small area. In the words of one observer, "To see one of these enormous flocks rise suddenly when alarmed is a wonderful spectacle; as you approach them, so long as they are on the water at rest, they look simply like a mass of faintly rosy snow. A rifle is fired, and then the exposure of the upper and under coverts of the wing turns the mass into a gigantic, brilliantly rosy scarf, waving to and fro in mighty folds as it floats away."

Breeding colonies of flamingos are particularly spectacular. The nests, as shown in the Bahama group, are built in shallow lakes or tidal waters and consist solely of mud that is dredged up in the vicinity. The size of each nest is determined by the depth of the water; few exceed eighteen inches in height, or just sufficient to raise the eggs a few inches above the surface of the water at its highest stage. One or very occasionally two whitish eggs are laid in the shallow cup at the top of each mound. Formerly it was believed that flamingos straddled their nests while brooding, but it has been found that they sit on their folded-up legs as do other birds. Newly hatched young have straight beaks and are fed by regurgitation. They leave their nests within a few days but are fed by their parents for several weeks thereafter.





ANTARCTIC BIRDS

Antarctica is a land of ice and snow and rock, without "land birds." But the Antarctic seas are rich in marine life, and penguins, petrels, and albatrosses have their headquarters in the southern oceans. Some may be restricted in breeding activities to tiny islands, or to the edge of the Antarctic Continent, but at other times they may range widely. Some may even migrate north across the tropical seas to north temperate waters; for example, in the austral winter (our summer) the Wilson's petrel is found in the Atlantic as far north as Labrador and the British Isles. Nor are all the species of these groups southern; a petrel, the fulmar, breeds in Greenland, a penguin is resident in the Galapagos Islands at the equator, and two albatrosses nest on Laysan Island in the North Pacific.

Antarctic birds do not fit well into the zoogeographical divisions of the rest of the world. Those avifaunas are dependent on factors involving land masses and land connections. To the sea birds, which characterize the far southern waters, such things are of small moment. The temperature, salinity, and other aspects of the sea water and ocean currents are important to their distribution, directly or indirectly, and their ranges tend to be concentric bands around Antarctica and at various distances from it. Two zones of surface water, Antarctic and Sub-Antarctic, are sometimes recognized. Though the Antarctic waters are cold (in summer the temperature may get up to only about 37° F. at its northern edge, at about the limit of the floating ice), they are extraordinarily rich in nutrient salts, which support a rich phytoplankton—microscopic floating plants—in which diatoms are important. The food chains are short and direct in these icy seas. The diatoms use the nutrient salts from the sea water and radiant energy from the sun; crustaceans, notably some popularly called "opossum-shrimp" or "krill," feed on the plankton; and penguins, petrels, and even whales and one of the seals eat the opossum-shrimp.

The birds characteristic of the Antarctic zone in the American quadrant, according to Murphy, are four species of penguins, two albatrosses, eight petrels, and a skua.

The Sub-Antarctic zone of surface water, which surrounds the Antarctic water mass, is warmer, with a summer temperature that may get up to nearly 60° F. in the north. It is saltier, too, but is still high in nutrient salts. Other species of animals occur, and the list of birds is not only longer but includes more types. Characteristic of it are only two penguins, but there are four albatrosses, seventeen petrels, three cormorants, a skua, and a gull.

A few birds are tolerant enough in their requirements to be restricted to neither zone but are characteristic of both the Antarctic and the Sub-Antarctic. This group includes two penguins, two albatrosses, three petrels, one cormorant, a gull, a tern, and a curious relative of the plovers, the sheath-bill, which is the only bird without webbed feet to reach the Antarctic.

Emperor Penguins

Penguins caricature human beings in their upright pose, shortsightedness, curiosity, apparent pompous dignity, and the like. They have been compared to little gentlemen in evening clothes. A near-sighted evangelist preaching to and trying*to convert a penguin colony even furnished the plot for a satire.

There is a certain superficial resemblance between penguins and the auks of northern waters. Both are sea birds, which on land sit upright, and many have white lower parts and dark upper parts. However, they are but distantly related. Penguin anatomy is so different from that of all other birds, in bone and muscle, that it has even been thought that penguins evolved from a different reptilian stock than have other birds. This is probably not true, but be that as it may, penguins are very different from auks. The most obvious difference is that auks and their relatives (auklets, murre, murrelets, guillemots, etc.) have normal bird wings, with good flight feathers, and all fly well, with a direct buzzing flight (though the extinct great auk was flightless). On the other hand, penguins have their wings completely modified into swimming organs or flippers and the feathers are scale-like. Auks are all residents of northern waters; penguins are characteristically southern, though one species lives as far north as the equator, in the Galapagos Islands. Even this species is directly related to the continuous population of penguins in the cold waters bordering the west coast of South America.

The penguins in this exhibit were brought back alive by the Second Byrd Expedition (1935) for the Chicago Zoological Society. They were the first of this species to come alive to this country, but as the result of a lung infection they survived only a few months. The Byrd Expedition's headquarters was on the floating shelf ice of the Ross Barrier in the Bay of Whales, where the ocean encroaches farthest toward the pole. The base camp was at 78° 34' S. Lat. and 163° 56' W. Long. (the south pole being at 90° S. Lat.).

Emperor penguins did not nest at the Ross Barrier but were only summer visitors; indeed, all the eight species of birds recorded were summer visitors. One must remember that the seasons are reversed in the south and the ornithologists of the expedition, Siple and Lindsey, report that the sun, after four months below the horizon, heralded the approach of spring by reappearing on August 22. The first spring migrants were Antarctic and snow petrels, arriving in October; later came the silver gray and Wilson's petrels, the giant fulmar, the skua, and the Adelie and emperor penguins. The last bird seen in the autumn was the snow petrel, on March 13, after which no birds of any kind were seen in the Bay of Whales until the following spring.

Although only eight species of birds were seen, two were in considerable numbers, notably the snow petrel, thousands of which were congregating on the ice in mid-summer, and the Antarctic petrel, in flocks of hundreds, "wheeling in unison above the great tabular bergs."



EMPEROR PENGUINS

Exhibit in Chicago Natural History Museum

The Bay of Whales, at $78^{\circ} 34'$ S. Lat., is the southern limit of range of seven of the eight species of birds that range far to the south. Only one species reaches farther south—the south polar skua. It has been found roosting at little fresh-water lakes in the black rock away from the coast, and wandering so widely over the snowy wastes of Antarctica that it may fly across the Antarctic continent. The farthest south record is $87^{\circ} 20'$ S., only 160 miles from the South Pole and 560 miles from the sea. Albatrosses, though characteristic of Antarctic waters, were not found so far south as the expedition camp; the farthest record was at $77^{\circ} 50'$ S. Lat.

Though the emperor penguin at the Bay of Whales was a non-breeding summer visitant, it breeds on the edge of the Antarctic ice and in the dead of winter in Stygian darkness when temperatures of 40 to 60 degrees below zero are normal and the sun does not come above the horizon. It then shares this fastness with no other bird. Some kinds of penguins make a nest or even dig a burrow in which to lay their eggs, but the emperor penguin makes no nest. Resting on the ice, it carries its egg on its feet, in the space between the belly, feet, and tail. If left untended the egg would freeze, but the incubating bird must eat, and a special type of community behavior has grown up to take care of this situation. Apparently only a minority of the emperor penguins breed each year; but the non-breeding birds in the colony are also eager to incubate eggs or brood chicks. When after perhaps days of fasting the incubating bird leaves its duties and goes to the sea to feed, there is a scramble to take over its duties. Sharp scuffles

may ensue. This eagerness to brood the young sometimes results in the chick's being so roughly handled that it creeps away for shelter into a crevice in the ice, which spells its doom, for there it inevitably freezes.

In the spring, October or November, the birds begin their northward migration. This they do by sitting on the edge of the ice until the pieces on which they're sitting break off and float to the north. It is on these ice rafts that the young complete their infancy. The emperor penguin's molt is a rapid one; it may be over in twenty days. During this time its plumage is in no condition to withstand the water, and the birds sit out this period starving on the edge of the ice or on floating ice pans.

The emperor is the largest of the penguins; it may stand about four feet high, and its weight has been recorded as up to 94 pounds. The bird walks upright, with great dignity, when not hurried, but its gait is quite different when it is pressed. Then it goes down on its breast and toboggans along rapidly, with alternate thrusts of its wings and feet. The penguin form and its adaptations are, of course, for life in the water, where penguins dive and swim in search of their marine animal food. The paddle-like wings are extremely efficient swimming organs and are thickly covered with very small scale-like feathers. Murphy estimated that there are something like 3,800 feathers in the dorsal surface of the forearm alone in the emperor penguin. To scramble out onto the ice would be a difficult feat, and the emperor accomplishes this by jumping, darting upward from considerable depth and landing feet first on ice as much as five feet above the water. Such a maneuver would also be extremely effective in taking it beyond reach of its principal enemy, the sea-leopard, one of the Antarctic seals. The voice of the emperor penguin is loud, to match its bulk. According to Wilson it has a defiant trumpet call that can be heard far over the ice fields.

